RISC User's Guide Errata Sheet March 2001

Chapter/Section	Page	Paragraph	Revision
1/1.2	1-3	4th para	"No further action (NFA) letters are issued by the LUST Program upon conclusion of ~~permanent~~ closure. ~~Risk-based closure letters are issued for releases addressed under the exposure-prevention clousre option.~~
3/3.0	3-2		Delete the 5th paragraph, headed "Section 3.9" 6th paragraph, change "Section 3.10" to "Section 3.9" 7th paragraph, change "Section 3.11" to "Section 3.10"
Appendix 4.1	A.4.1-4		Benzo(b)fluoranthene, Commercial, change 111 to 110 Xylenes (mixed), Residential, change 290 to 280 Xylenes (mixed), Commercial, change 5,100 to 5,000

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1.0 Introduction

In July 1994, the Indiana Department of Environmental Management (IDEM) decided that all of its cleanup programs should work together to develop consistent standards and procedures. As a result, IDEM has developed a comprehensive set of policies known as the Risk-Integrated System of Closure (RISC). RISC is a guidance policy and does not have the force of law; rather, it provides a framework within which to implement the laws and rules governing the remediation of sites in Indiana. RISC represents an extensive effort on the part of IDEM staff and external stakeholders to establish consistent standards across existing remediation programs while at the same time recognizing the unique requirements of each program. Consistent with this goal, RISC consists of two volumes. The RISC Technical Guide sets forth policies and procedures applicable to all of IDEM's remediation programs.

This User's Guide provides information on the use of RISC within each of the existing remediation programs: the Resource Conservation and Recovery Act (RCRA) Closure and Corrective Action Program, Subtitle C; the Leaking Underground Storage Tank (LUST) Program; the Voluntary Remediation Program (VRP); the State Cleanup Program (SCP), and the Brownfields Program. The User's Guide is designed to assist the Office of Land Quality's remediation programs in using a consistent, risk-based approach for addressing contaminated sites in compliance with regulatory requirements. The User's Guide is divided into five chapters. Each chapter provides details on individual program processes and the applicability of RISC to that program.

It should be noted that spill responses performed in accordance with 327 Indiana Administrative Code (IAC) 2-6.1 are not remedial actions and will not utilize RISC. If the spill response does not result in the complete removal of the released material, the incident may be turned over to the appropriate remediation program for further work. At that time, RISC would be applicable.

1.1 RCRA Closure and Corrective Action, Subtitle C

RCRA was enacted in 1976 as an amendment to the Solid Waste Disposal Act (SWDA). Federal regulations to implement RCRA were adopted in 1980. Indiana has adopted the federal regulations specified in 329 IAC 3.1. The principal objective of RCRA is "cradle-to-grave" management of hazardous wastes, from the point of generation

through final disposition. A primary component of RCRA is the issuance of permits to facilities that store, treat, or dispose of hazardous wastes to ensure proper management of hazardous waste, and to ensure closure of inactive hazardous waste facilities and post-closure care of closed units, if required. Regulatory requirements applicable to permitting, closure, and post-closure of hazardous waste management units are presented in Title 40 of the *Code of Federal Regulations* (40 CFR), Parts 264, 265, and 270. These requirements are incorporated by reference into 329 IAC 3.1-9-1, 329 IAC 3.1-10-1, and 329 IAC 3.1-13-1, respectively.

In 1984, RCRA was amended by the Hazardous and Solid Waste Amendments (HSWA) to give the U.S. Environmental Protection Agency (U.S. EPA) authority to require treatment, storage, or disposal (TSD) facilities (including facilities no longer operating as TSDs and facilities that have or had interim status) to investigate and remediate contamination resulting from any activity at the facility, even if the activity preceded the enactment of RCRA. This investigation and remediation process is known as "corrective action." Under the corrective action process, TSD facilities are required to implement corrective action for all releases of hazardous waste or constituents that may cause a threat to human health or the environment. Corrective action can also be required for releases of hazardous waste or constituents that have migrated beyond the owner or operator's property boundary.

RISC supplements RCRA closure and corrective action standards by providing guidance in determining the cleanup levels necessary to control, minimize, or eliminate threats to human health and the environment. If further maintenance is necessary to control or minimize a threat to human health or the environment, the RCRA program initiates post-closure care requirements. Closure and post-closure standards are specific to the type of TSD unit, such as tanks, containers, waste piles, surface impoundments, and landfills.

1.2 LUST Program

In 1988, the scope of RCRA was broadened to include the regulation of most underground storage tanks (UST) containing petroleum and hazardous substances. Subsequently, the U.S. EPA promulgated rules in 40 CFR, Part 280, to prevent and minimize the impact of releases from USTs through the use of corrosion protection, spill and overflow prevention, leak detection, and corrective action. Indiana enacted Indiana Code (IC) 13-23 (modeled after RCRA regulations) for petroleum and hazardous substances. IDEM then promulgated 329 IAC 9 to provide standards for regulating UST operation and

maintenance, corrective action, and closure. Later, the Indiana Legislature established the Excess Liability Trust Fund (ELTF) to reimburse UST owners and operators for the costs of corrective action through the assessment of annual fees for eligible regulated USTs.

IDEM's LUST Program receives release reports for regulated and unregulated tank owners and oversees compliance with corrective action and closure requirements for petroleum and hazardous substance releases. Hazardous waste release reports are referred to the RCRA Closure and Corrective Action Program for follow-up.

Typical UST sites include petroleum storage and dispensing facilities (such as gas stations), fleet fueling facilities, industrial manufacturers, and government installations. Federal regulations place liability for the costs of remediation on tank owners and operators.

RISC provides a set of preapproved procedures and cleanup goals designed to streamline a LUST Program participant's interaction with IDEM. This guidance should enable participants to better evaluate their options, facilitate cleanups, and receive ELTF reimbursements.

No further action (NFA) letters are issued by the LUST Program upon conclusion of permanent closure. Risk-based closure letters are issued for releases addressed under the exposure-prevention closure option.

1.3 VRP

The VRP was established in 1993 in response to a growing need for State review and oversight of voluntary investigation and remediation activities, particularly with respect to property transactions. IC 13-25-5, Voluntary Remediation of Hazardous Substances and Petroleum, created the VRP and gave IDEM broad authority to establish guidelines for the approval of remediation work plans. Indiana is therefore one of the first states to pass legislation that addresses liability issues associated with buying, selling, or developing property contaminated by petroleum or hazardous substances. The agency's guidelines include provisions for using risk assessments to determine cleanup goals.

The VRP provides a process for property owners, operators, and potential purchasers to voluntarily enter into an agreement with IDEM to remediate contaminated property. When the remediation is successfully completed, IDEM issues a Certificate of Completion and the Governor's office issues a Covenant Not To Sue to the applicant for the remediated property. These documents assure both the applicant and future land owners that the voluntary remediation has

been performed properly and that associated future liability is strictly limited. This assurance is important to prospective property purchasers and prospective lenders when property is being offered as collateral. Active participation in the VRP may facilitate the sale and reuse of industrial and commercial properties in the State, an important benefit to all Indiana residents. In addition, a memorandum of agreement between IDEM and U.S. EPA provides some assurance that U.S. EPA will also not pursue an enforcement action.

Any site, regardless of its operational status, is eligible to participate in the VRP program unless one or more of the situations below applies.

- A state or federal enforcement action concerning the proposed cleanup is pending.
- A federal grant compels IDEM to take enforcement action.
- Conditions at the site are considered to present an imminent and substantial threat to human health or the environment.
- The VRP application is incomplete.

Participants are required to pay for VRP costs.

The VRP process is expanded via RISC by providing procedures for site characterization and sampling as well as guidance for nondefault approaches. This expanded guidance is intended to further facilitate the VRP process as well as reduce transactional costs for participation in the program.

1.4 SCP

The SCP is similar to the federal Superfund program except it is solely a State program and not a joint federal and state effort. It also differs from the Superfund Program because it provides for jurisdiction over petroleum releases as well as hazardous substance releases. Examples of SCP sites include active or abandoned petroleum terminals and refineries, abandoned landfills, former lead smelting and battery recycling sites, and other active or abandoned industrial sites. SCP sites are evaluated using the Indiana Scoring Model (ISM), which is discussed in 329 IAC 7-1. The list of SCP sites is published in the Indiana Register as part of the Indiana Commissioner's Bulletin. Responsible parties and the State's Hazardous Substances Response Trust Fund provide funding for these cleanups.

The legal authority for the SCP includes Indiana's "Superfund" law,

the Hazardous Substances Response Trust Fund statute (IC 13-25-4). The law establishes a fund to clean up sites contaminated with hazardous substances, establishes liability for potentially responsible parties, and authorizes IDEM to recover costs associated with cleanups. IC 13-24-1 governs petroleum releases and authorizes IDEM to require cleanup of petroleum contamination.

IC 13-25-4 states that IDEM can recover the costs of removal or remedial actions consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The RISC policies supplement the NCP by providing a designated system for screening a site, assessing risk, and establishing closure levels.

Chapter 2 RCRA Closure and Corrective Action Program

2.0 Introduction

Overview of Chapter 2

- Definitions
- Closure Overview
- Corrective Action Plan
- Closure Plan Preparation
- Closure Options
- RCRA Corrective Action Process
- Sample Quality Assurances and Analytical Requirements
- RCRA Soil Sampling
- RCRA Ground Water Sampling

This chapter presents guidance from the Indiana Department of Environmental Management (IDEM) Office of Land Quality (OLQ) for preparing Resource Conservation and Recovery Act (RCRA) closure plans, cleanup plans, and corrective action work plans to meet the requirements of 329 Indiana Administrative Code (IAC) 3.1.

Although the RISC Technical Resource Guidance Document offers a flexible generic framework for remedial activities in Indiana, certain hazardous waste rules preclude the sole use of the RISC Technical Guide as a directive in achieving RCRA closure and corrective action requirements. This chapter is intended to provide default options for achieving RCRA closure, or "No Further Action" (NFA) status for corrective action solid waste management units and areas of concern. RCRA Corrective Action requirements (Hazardous and Solid Waste Amendments [HSWA] of 1984) pertain to any facility that, at any time, had interim status as well as facilities that operated without a permit when they should have had one. An owner or operator of a facility regulated under HSWA is responsible for instituting corrective action as necessary to protect human health or the environment from releases of hazardous wastes or hazardous constituents.

This chapter is not intended to be all-inclusive in the discussion of requirements and responsibilities, or to limit the use of site-specific options that may differ from the default. The RISC Technical Resource Guidance Document establishes a framework for developing a non-default approach for RCRA closure or corrective action cleanup. Environmental requirements implemented by other programs (such as the Superfund Program and the Voluntary Remediation Program [VRP]) may still apply to a site or facility both before and after certification of RCRA closure.

Indiana is authorized to administer its hazardous waste management program in place of the federal program. To develop the hazardous waste program, the State has (with few exceptions and deletions) incorporated by reference the federal hazardous waste regulations in Title 40 of the *Code of Federal Regulations* (CFR), Parts 260 through 270. These federal regulations are mandated by Subtitle C of RCRA. For convenience, federal regulations (when appropriate) are cited in this chapter. In addition, the acronym "RCRA" is used throughout this chapter as a general term for hazardous waste regulatory requirements.

Questions that arise and requests for other guidance should be directed to the site-specific OLQ or Office of Enforcement (OE) contact. The procedures outlined in this chapter are intended to clarify and standardize the RCRA closure and corrective action process. Owners or operators are encouraged to meet with IDEM staff as needed to develop plans for remediation, ground water monitoring, and decontamination.

IDEM recognizes that the costs of closure and remediation may be significant and intends to minimize these costs wherever possible. Therefore, obtaining OLQ approval of a closure or cleanup plan is strongly recommended before any closure or cleanup activity is implemented. Closure or cleanup activities conducted prior to OLQ approval may need to be altered or even repeated if the closure or cleanup activities do not conform with applicable regulations or fail to protect human health and the environment.

This guidance is intended to replace the Non-rule Policy Document entitled Hazardous Waste Management Unit Closure Guidance, (identification number WASTE-0013-NPD).

2.1 Definitions

Many terms used in this non-rule policy document are defined in 329 IAC 3.1 and 40 CFR 260.10. The following additional definitions apply to facilities subject to regulation for RCRA hazardous waste permitting, corrective action, and closure only. These terms replace or supplement those in the Glossary of the RISC Technical Manual.

Active portion means the portion of a facility where TSD operations are being or have been conducted after the effective date of 40 CFR Part 261 and that is not a *closed portion* (see also *closed portion* and *inactive portion*).

Aquifer means a geologic formation, group of formations, or part of a formation capable of yielding a significant amount of ground water to wells or springs.

Area of concern (AOC) means a unit or area that does not meet the definition of a *solid waste management unit (SWMU)* but that merits further investigation to determine the presence or absence of releases.

Certification means a statement of professional opinion based upon knowledge and belief.

Closed portion means the portion of a facility that an owner or operator has closed in accordance with the approved facility closure plan and all applicable closure requirements (see also *active portion* and *inactive portion*).

Closure of a hazardous waste (RCRA) facility means action taken to secure the hazardous waste management facility or unit(s) in a manner that will protect human health and the environment in accordance with the closure plan requirements of 40 CFR 265, Subpart G, and 40 CFR 264, Subpart G. Closure of a SWMU or AOC means that the owner or operator has demonstrated, either through investigation or remediation, that the unit or area does not warrant further action at this time.

Closure by removal or decontamination means the decontamination, treatment, or removal of the following: all hazardous waste, hazardous waste constituents, hazardous constituents, leachate, contaminated run-on and runoff, waste decomposition products, liners, and contaminated soil (including ground water) that pose a substantial present or potential threat to human health or the environment. This standard is achieved by demonstrating attainment with one of the following closure levels:

- estimated quantitation levels (EQL) for organic constituents, or the mean plus one standard deviation of background for non-organics. This type of closure is a "clean closure".
- default or non-default residential levels. This type of closure is a "residential closure".
- default or non-default industrial levels if the owner files a restrictive covenant which limits the land use of the property and certain activities that can occur at the property (i.e. prohibition on drinking untreated groundwater) in accordance with the approved risk assessment. This type of closure is an "industrial closure".

Closure in-place means leaving either waste in place (e.g. a landfill) or contamination in place after closure when contamination cannot be practicably removed during closure, and post-closure care of engineered structures or other facilities is needed. Closure in-place must comply with the applicable requirements for removing or stabilizing the waste, capping the hazardous waste management unit or utilizing other appropriate engineering controls, developing and

implementing a ground water monitoring plan, and providing a written post-closure care plan subject to IDEM approval.

Compliance point is a vertical surface located at the hydraulically down-gradient limit of the waste management area that extends down into the uppermost aquifer underlying the regulated unit(s). The waste management area can encompass more than one regulated unit (see 40 CFR 264.95).

Directed sampling is the term for using professional judgment and prior site knowledge to choose sampling locations. It is synonymous with the term "judgmental sampling".

Disposal means the discharge, deposit, injection, dumping, spilling, leak, or placement of any solid or hazardous waste into or on any land or water so that such solid or hazardous waste or any constituent thereof can enter the environment, be emitted into the air, or be discharged into any water, including ground water.

Disposal facility means a facility or part of a facility at which hazardous waste is intentionally placed into or on any land or water and at which waste will remain after closure. The term *disposal facility* does not include a corrective action management unit into which remediation wastes are placed.

Facility is defined as follows:

1. All contiguous land, structures, other appurtenances, and improvements on the land used for TSD of hazardous waste. A facility can consist of several TSD operational units (for example, one or more landfills, surface impoundments, or combinations of such units).

2. For the purposes of implementing corrective action under 40 CFR 264.101, all contiguous property under the control of the owner or operator seeking a hazardous waste management permit. This definition also applies to facilities implementing corrective action under Indiana Code (IC) 13-22-13.

Final closure or *total closure* means the closure of all hazardous waste management units at the facility in accordance with all applicable closure requirements so that hazardous waste management activities

under 40 CFR, Parts 264 and 265, are no longer conducted at the facility unless subject to the provisions in 40 CFR 262.34.

Generator means any person, by site, whose actions or processes produce hazardous waste identified or listed in 40 CFR, Part 261, or whose actions first cause a hazardous waste to become subject to regulation.

Ground water means water located below the ground surface in interconnected voids and pore spaces in the zone of saturation.

Ground water protection standard means a concentration limit (as defined in 40 CFR 264.94) established by the Commissioner in a facility permit for hazardous constituents (as defined in 40 CFR 264.93) detected in ground water from the regulated unit in the uppermost aquifer at the *compliance point* (as defined in 40 CFR 264.95) during the compliance period (as defined in 40 CFR 264.96). To establish this concentration limit, the Commissioner must consider which hazardous constituents are from the regulated unit and their potential to harm human health and the environment.

Hazardous constituent means any constituent identified in Appendix VIII of 40 CFR, Part 261**.**

Hazardous waste is defined in 40 CFR 261.3. For Corrective Action purposes, this term includes any chemical that poses or may pose a threat to human health or the environment (see IC 13-11-2-99).

Hazardous waste management unit is a contiguous area of land on or in which hazardous waste is placed, or the largest area in which there is significant likelihood of hazardous waste constituents mixing in the same area. Examples of hazardous waste management units include a surface impoundment, waste pile, land treatment area, landfill cell, incinerator, tank and its associated piping and underlying containment system, and container storage area. A container alone does not constitute a unit. The unit includes the containers and the land or pad upon which the containers are placed.

Industrial closure includes the decontamination, treatment, or removal from a unit of all hazardous waste, hazardous waste constituents, hazardous constituents, leachate, contaminated run-on and run-off, waste decomposition products, liners, and contaminated soil (including ground water) that pose a substantial present or potential threat to

human health or the environment at closure levels exceeding default or non-default residential levels but below industrial levels. Industrial closures are limited to commercial/industrial properties that have appropriate Standard Industrial Classification (SIC) codes listed in Appendix 4 of the RISC Technical Guide.

In operation refers to a facility that is treating, storing, or disposing of *hazardous waste*.

Inactive portion means the portion of a facility that is not operated after the effective date of 40 CFR Part 261 (see also *active portion* and *closed portion*).

Inner liner means a continuous layer of material placed inside a tank or container that protects the construction materials of the tank or container from the contained waste or reagents used to treat the waste.

Leachate means any liquid, including any suspended components in the liquid, that has percolated through or drained from hazardous waste.

Liner means a continuous layer of natural or man-made materials beneath or on the sides of a surface impoundment, landfill, or landfill cell that restricts the downward or lateral escape of *hazardous waste*, *hazardous waste constituents*, or *leachate*.

Management or *hazardous waste management* means the systematic control of the collection, source separation, storage, transportation, processing, treatment, recovery, and disposal of hazardous waste.

No further action at this time is a Corrective Action term meaning that the owner or operator of a TSD facility does not currently need to address a SWMU or AOC either because a release was not documented or because the owner or operator has taken appropriate action to ensure that human health and the environment are adequately protected.

On-site means the same or geographically contiguous property which may be divided by public or private right-of-way, provided the entrance and exit between the properties is at a crossroads intersection, and access is by crossing as opposed to going along the right-of-way. Non-contiguous properties owned by the same person but connected

by a right-of-way, which he controls and to which the public does not have access, is also considered on-site property.

Operator means the person responsible for the overall operation of a facility.

Owner means the person who owns a facility or part of a facility.

Partial closure means the closure of a hazardous waste management unit in accordance with applicable closure requirements in 40 CFR, Parts 264 and 265, at a facility that contains other active hazardous waste management units. For example, partial closure may include the closure of a tank (including its associated piping and underlying containment systems), landfill cell, surface impoundment, waste pile, or other hazardous waste management unit while other units of the same facility continue to operate.

Personnel or *facility personnel* means all persons who work at or oversee the operations of a hazardous waste facility and whose actions or failure to act may result in noncompliance with the requirements of 40 CFR, Part 264 or 265.

Point of compliance is a term used in RCRA but not in this User's Guide. To avoid confusion with similar terms, this chapter uses the term *compliance point*. The terms *point of compliance* and *compliance point* can be used interchangeably in RCRA.

Release means any spill, leak, pouring, emission, emptying, discharge, injection, pumping, escape, leaching, dumping, or disposal of hazardous wastes (including hazardous constituents) into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles containing hazardous wastes or hazardous constituents).

Remediation waste means all solid and hazardous wastes, all media (including ground water, surface water, soil, and sediment), and debris that contain listed hazardous wastes or hazardous constituents, or that themselves exhibit a hazardous waste characteristic and which is managed for the purpose of implementing Corrective Action requirements under 40 CFR 264.101 and RCRA Sections 3004(u), 3004(v), and 3008(h).

Representative sample means a sample of a universe or whole (for example, a waste pile, lagoon, or ground water) that can be expected to exhibit the average properties of the universe or whole.

Screening is a RISC term that refers to the initial sampling event of site characterization to determine the need for a broader investigation of the nature and extent of contamination.

Soil means unconsolidated earth material composing the superficial geologic strata (material overlying bedrock) consisting of clay, silt, sand, or gravel particles as classified by the U.S. Department of Agriculture (USDA) Soil Conservation Service (SCS) or a mixture of such materials with liquids, sludges, or solids that is inseparable by simple mechanical removal processes and that is primarily composed of soil by volume based on visual inspection.

Solid waste is defined in 40 CFR 261.2.

Solid waste management unit (SWMU) means any discernable existing or historical unit (permitted or unpermitted) at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include any area at a facility where hazardous constituents have been routinely and systematically released.

Storage means the holding of hazardous waste for a temporary period at the end of which the hazardous waste is treated, stored, or disposed of elsewhere.

Treatment means any method, technique, or process, including neutralization, that achieves the following:

- Changes the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize such waste, recover energy or material resources from the waste, or render such waste non-hazardous or less hazardous
- Makes the waste safer to transport, store, or dispose of
- Makes the waste amenable for recovery or storage or reduces the volume of the waste

Unit means either a *hazardous waste management unit* or a *SWMU* unless otherwise specified.

Unsaturated zone or *zone of aeration* means the zone between the land surface and the water table.

Uppermost aquifer means the geologic formation nearest the natural ground surface that is an aquifer, as well as lower aquifers that are hydraulically interconnected with this aquifer within the facility's property boundary.

2.2 Closure Overview

Closure levels, regulations, and agency review and public notice of closure plans are discussed below.

2.2.1 Closure Levels

Closure in this chapter is used to describe the process of taking a RCRA hazardous waste management unit (i.e. a treatment, storage, or disposal [TSD] unit) out of service. Closure is required for all hazardous waste management units following termination of interim status, after denial of an operating permit, or after facility closure.

With the development of the RISC Technical Guide, default closure levels have been established using conservative exposure assumptions. These levels have been determined to be protective of human health and the environment and are presented in Table A of Appendix 1 of the RISC Technical Guide. The table provides constituent closure levels based on residential exposure assumptions and on industrial exposure assumptions.

There are two general types of closure:

1) closure by removal or decontamination, and

2) closure with waste or contamination remaining in place.

The premise of closure by removal or decontamination (hereafter referred to as "closure by removal") is that all hazardous waste has been removed from a RCRA TSD unit and any releases at or from the unit have been remediated so that further regulatory control under RCRA Subtitle C is no longer necessary to protect human health and

the environment. Closure by removal is accomplished either by demonstrating that:

(1) constituent levels in soil do not exceed the analytical method's EQL for organics and the mean plus one standard deviation of background levels for inorganics, or
(2) constituent levels remaining in soil do not exceed default or non-default residential closure levels, or
(3) constituent levels remaining in soil do not exceed default or non-default industrial levels if a restrictive covenant has been placed on the property which limits the use of the property to land uses and/or activities consistent with the approved risk assessment.

Closure levels for ground water may be: the constituent concentrations listed in 40 CFR 264.94(a); the Maximum Contaminant Limit (MCL) in 40 CFR 141; the alternate concentration limits (ACL) established in accordance with 40 CFR 264.94(a)(3); or background levels for each constituent as specified in the permit, if applicable.

A facility that meets industrial closure levels would not be subject to post-closure requirements. ***However, a restrictive covenant that limits the activities and/or land use consistent with the approved risk assessment must be established.*** Industrial cleanup levels must be achieved throughout the closed unit and in any areas affected by releases from the unit. This scenario cannot be used at units where waste remains in place (such as land disposal units that closed in-place). Further information relating to industrial closure is presented in Section 2.6.2 of this User's Guide.

Closure in-place involves leaving waste in place or leaving contamination exceeding industrial closure levels in place. This category includes all land disposal units and other units where contaminants in excess of industrial closure levels remain in place and engineering controls are needed to achieve the closure performance standard. Land disposal units require capping and maintenance (along with ground water monitoring) for the post-closure period. At other units where waste has been removed, but contamination remains, there is a need for some continuing engineering controls or other structures to insure that the exposure and land use assumptions remain valid. These units may be eligible for more limited post-closure care than land disposal units, depending on the circumstances. More information is provided in Section 2.6.3.1 of this Guide.

2.2.2 Closure Regulations

IDEM regulates the management of hazardous waste under the authority of the Environmental Management Act, IC 13, and the Indiana hazardous waste rules, 329 IAC 3.1 *et seq*. These rules incorporate, by reference, 40 CFR Parts 260 through 270. Closure of hazardous waste facilities under interim status is regulated under 40 CFR 265, Subpart G, and 329 IAC 3.1-10 and 14. Closure of facilities that have Part B permits is regulated under 40 CFR 264, Subpart G; 40 CFR 270.1(c)(5); and 329 IAC 3.1-9 and 15. Copies of 329 IAC 3.1 *et seq*. can be obtained by calling the Legislative Services Agency at (317) 232-9581. Copies of 40 CFR Parts 260 through 299 can be obtained by writing to the following address:

U.S. Government Printing Office
Superintendent of Documents
Mail Stop: SSOP
Washington, DC 20402-9328

2.3 Corrective Action Overview

Corrective Action's goal is to evaluate the potential for release of hazardous constituents and remediate releases as necessary to protect human health and the environment. Corrective Action requirements pertain to any facility that is operating or had operated as a TSD facility. This includes facilities that had interim status at any time, as well as facilities that operated without a permit when they should have had one. Corrective Action can be initiated through either a permit, if applicable, or an order. Facilities can attempt to close hazardous waste management units at the same time they are addressing releases from SWMUs and AOCs. Under this situation, the facility can request to complete closure of the hazardous waste management unit through the RCRA corrective action process.

The RCRA Corrective Action process consists of five key elements:

- Potential source identification
- Release assessment
- Release investigation
- Evaluation and selection of an appropriate remediation technology or technologies

- Remediation of the release(s)

Not all five elements need to be performed at all facilities. However, each facility subject to corrective action will be evaluated for its potential to release hazardous constituents. If the potential exists, the facility must perform a release assessment. The decision to proceed to subsequent elements depends on the level and type of hazardous constituent present. In order to achieve a "no further action at this time" determination for the facility, it must be demonstrated that either hazardous constituent levels do not exceed background levels or EQLs or that hazardous constituents do not pose unacceptable risks to human health or the environment. This determination can be performed either after the release assessment or the release investigation, or upon completion of remediation activities.

2.4 Closure Plan Preparation

In accordance with 40 CFR 264.112 and 265.112, the closure plan must identify steps necessary to perform partial or final closure of the facility at any point during its active life. To this end, the following sections detail the type of information that must be included in the closure plan.

2.4.1 Facility Description

A facility description must be provided that includes the following information:

1. Description of the type of industry
2. Standard Industrial Code (SIC)
3. Products
4. Location
5. Size
6. Other permitted activities occurring on site (for example, discharge using a National Pollutant Discharge Elimination System [NPDES] permit)
7. Other general summarized information

2.4.2 Description of Waste Management Units

The closure plan should describe each container storage area, tank system, incinerator, land treatment unit, landfill, surface impoundment,

waste pile, or other hazardous waste management unit that is to be addressed. For each unit, the following information must be provided:

1. A discussion of the types of waste management activities that occurred at the unit, including the capacity and the maximum inventory of the unit and the process code and unit of measure from the Part A permit application (if applicable)

2. Descriptions of each waste in the unit, including the common name(s) and U.S. EPA hazardous waste code(s)

3. A discussion of the time period of use, dimensions, capacity, topography, soil types (as appropriate), copies of past spill reports, and any other relevant information

4. A copy of the most recent Part A permit application, if applicable

Plans for total closure must address all units at the facility. Plans for partial closure should indicate which units are to remain active. This information should also be indicated on the facility's Part A permit application.

The closure plan should state *verbatim* the Closure Performance Standard in 40 CFR 265.111 or 264.111.

2.4.3 Maps and Drawings

The closure plan should provide a topographic or county map indicating the location of the facility without obscuring the features. The topographic or county map should include features within 1,000 feet of each property line of the facility. The closure plan should provide detailed maps or diagrams of the facility itself; detailed drawings of each unit to be closed; and cross sectional drawings of secondary containment systems, landfills, and surface impoundments. Topographic features, well locations, and surface water run-on and run-off directions should be discussed or included on the detailed maps, drawings, and diagrams.

Detailed maps or diagrams of the facility itself should also include, but not be limited to, the following information:

1. Map scale and date

2. Orientation of the map (north arrow)
3. Legal boundaries of the facility
4. Access control (fences and gates)
5. Surrounding land uses (residential, commercial, agricultural, and recreational)
6. On-site buildings and structures, including the entrances and exits of each
7. Locations of each on-site hazardous waste management unit, including clear identification of units undergoing closure
8. The USDA SCS soils survey map of the area surrounding the units

Detailed drawings of each unit to be closed should also include, but not be limited to, the following information:

1. Drawing scale and date
2. Orientation of the drawing (north arrow)
3. Dimensions, entrances, and exits of buildings or structures located adjacent to the unit undergoing closure
4. Unit dimensions
5. Appurtenant structures or equipment of the unit
6. Relationship of the unit to other points or structures on the facility property

Additional maps and drawings are discussed in Section 2.9, RCRA Soil Sampling, for soil investigation.

2.4.4 Containment Description

The closure plan should provide a detailed description of the containment of each unit undergoing closure. The closure plan should describe how the unit, including the containment, was designed and operated to prevent the migration or escape of hazardous waste, hazardous constituents, leachate, and runoff from the unit.

For container and tank storage units and incinerators, the discussion should focus on secondary containment structure features (such as walls, berms, and slope), if any, for the entire unit, including ancillary equipment, if applicable. The discussion should include items such as capacity, dimensions, age, integrity, materials of construction, joints, fittings, coatings or sealants applied to the structure, and chemically resistant water stops used at joints.

For waste piles, landfills, surface impoundments, and land treatment units, the description should provide information on the liner and the cover system (if applicable). Specifically, information should include the following:

- Liner type, composition, manufacturer, dimensions, thickness, and age
- Brief description of the original liner installation procedures, including seaming and quality assurance/quality control (QA/QC) checks
- Brief description of any liner maintenance and inspection performed after installation
- Description of the structural condition of the unit, including cracks, tears, leaks, punctures, holes, or unsealed joints or seams of the secondary containment system, liner, or cover system

If containment structures are not present or are inadequate, the closure plan should discuss the drainage features of the unit and its surroundings and where spilled waste would flow. This discussion should also describe the facility setting, including the attenuative properties of the soil between the unit, ground water, and surface water and any other factors that would influence the mobility of hazardous waste or hazardous waste constituents and their potential to migrate to ground water and surface water.

2.4.5 Hazardous Waste List

The closure plan must provide a complete, detailed list of all hazardous wastes (chemical name and the U.S. EPA hazardous waste number) treated, stored, or disposed of at each unit. Common names or trade names should not be used when generic chemical names are available. For each unit, the closure plan should indicate the total volume or weight of each hazardous waste managed on site over the active life of the facility.

2.4.6 Air Emissions

When applicable, the closure plan should specify that air emissions problems related to closure will be eliminated or minimized, including

nuisance problems such as dust or odors. Example problems include solvent emissions during remediation, transfers, and decontamination operations and dust problems related to decontamination, soil excavation, and solidification activities.

2.4.7 Personnel Safety and Fire Prevention

The closure plan should indicate that Occupational Safety and Health Administration (OSHA) and other government regulations will be followed to protect all personnel (including contractors and visitors) involved in the closure project and those who could be possibly exposed to hazardous waste by the closure activities.

2.4.8 Closure Schedule

According to 40 CFR 264.113(a) and 265.113(a), all hazardous waste must be treated, removed, or disposed of in accordance with the approved closure plan within 90 days after approval of the closure plan by IDEM or after receipt of the final volume of hazardous wastes for permitted units. Closure activities must also be completed in accordance with the approved closure plan within 180 days after approval of the closure plan or 180 days after receipt of the final volume of hazardous wastes for permitted units.

The plan should contain a timetable that shows all critical closure dates, including dates for waste removal, sampling, soil removal, critical times for the independent engineer or his or her representative to be present on site, site restoration, times for survey plat (if applicable), independent engineer's certification, and other relevant activities. This timetable should generally start at the point of closure plan approval or some other definable date and should not be based on calendar dates.

IDEM may require that the owner or operator contact OLQ before conducting certain critical activities (such as soil sampling or removal, ground water monitoring well installation, or well sampling) to allow an inspector to be present to observe these activities.

Closure time periods longer than those listed above may be granted if detailed justification is provided that meets the requirements of 40 CFR 264.113(a) or 265.113(a). Extensions of the closure period are discussed in 40 CFR 264.112(c)(2)(ii) and 265.112(c)(2)(ii), which

reference the permit modifications of 40 CFR 270.42. It should be noted that the time period for closure by removal should not exceed 3 years. If closure by removal cannot be achieved, a post-closure plan must be submitted for approval. Closure certification is due 60 days after closure completion.

2.4.9 Closure and Post-Closure Cost Estimates

The closure plan should include a closure cost estimate calculated in current dollars in accordance with 329 IAC 3.1-14-3 or 329 IAC 3.1-15-3. Closure costs should, at a minimum, include estimates for removal of inventory, decontamination, sampling and analysis, and closure certification. The costs should be based on a third party closing the facility. Closure costs should also include a contingency fee based on a percent of total costs to compensate for errors of omission and unforeseeable circumstances. For facilities that require post-closure, a separate post-closure cost estimate must also be provided in accordance with 329 IAC 3.1-14-13 and 329 IAC 3.1-15-5.

2.4.10 Financial Assurance

Financial assurance must be established for closure and post-closure based on the closure and post-closure cost estimates. Several options are available under 329 IAC 3.1-14 and 329 IAC 3.1-15 for establishing the appropriate financial mechanism. For enforcement-driven closure plans, the administration of this requirement is handled by the OLQ through the Office of Enforcement. For other closure plans, the administration of this requirement is handled solely by OLQ.

2.5 Administrative Closure Procedures

The general process for, and exceptions to, closure activities are discussed below.

2.5.1 Agency Review and Public Notice of Closure Plans

When IDEM receives a closure plan, the closure plan is logged in and assigned to a reviewer. The closure plan is reviewed for completeness and technical adequacy. If the plan is inadequate, the owner or operator is sent a Notice of Deficiency (NOD) that specifies the plan's inadequacies. The plan must be revised to address the items in the NOD and resubmitted to IDEM. When IDEM receives a complete and technically adequate plan, IDEM will approve or modify the closure plan in accordance with 40 CFR 265.112 and 264.112. Figure 2.1 presents a flow chart that outlines the closure plan review process. The number of copies of the closure plan required for review depends on the unit type undergoing closure. Guidance on the number of copies needed will be given prior to closure plan submittal.

A Public Notice is then filed in a local newspaper, and the public will be given a 30-day opportunity to submit written comments and request modifications of the closure plan. A public hearing may be conducted at IDEM's discretion.

2.5.2 Request for Administrative Review

If the owner or operator wishes to challenge a closure plan modification that has been made by IDEM for the purpose of closure plan approval, a Petition for Administrative Review and a Petition for a Stay of Effectiveness must be submitted to the Office of Environmental Adjudication within 15 days of the date of receipt of the closure plan approval letter. The petition must include facts demonstrating that one is either the applicant, a person aggrieved or adversely affected by the decision, or likewise entitled to review by law. The petition must specifically identify the portions or conditions of the modified closure plan for which a stay or administrative review is being requested. Further information on this issue is presented in IC 13-15-6 and 4-21.5-3.

2.5.3 Time Extensions During the Closure Period

Under 40 CFR 264.113 and 265.113, the Commissioner may approve an extension of the 180-day closure period if the owner or operator can demonstrate, among other things, that:

1. Closure activities will necessarily take longer than180 days to complete, and

2. The owner or operator has taken and will continue to take all steps to prevent threats to human health and the environment from the unclosed but inactive facility.

For closures under interim status requirements, 40 CFR 265.113 (b) and (c) state that an extension of the 180-day closure period must be requested at least 30 days prior to the expiration of the 180-day period. Justification for the time extension must be provided. For permitted facilities undergoing closure, 40 CFR 264.113(d) requires that the permit be modified in accordance with 40 CFR 270.42.

As previously noted, the closure by removal time period should generally not exceed 3 years. If the facility is attempting a plume stability assessment according to RISC Appendix 3, or if the risk assessment requires longer than 3 years to complete, the closure period may be extended. If closure by removal cannot be achieved in the approved period, a post-closure plan must be submitted for approval.

2.5.4 Closure Plan Modifications

An owner or operator with an approved closure plan must submit a written request to IDEM to authorize a change to the approved closure plan. The written request must include a copy of the amended closure plan for approval by IDEM. The closure plan must be modified whenever unexpected events require changes to the plan.

The closure plan must be amended at least 60 days after an unexpected event has occurred that affects the closure plan. If an unexpected event occurs during the partial or final closure period, the owner or operator must amend the closure plan no later than 30 days after the unexpected event. These provisions also apply to owners or operators of surface impoundments and waste piles who intended to remove all hazardous wastes upon closure but who are required to close as landfills in accordance with 40 CFR 265.310. If the amendment to the plan is a Class 2 or 3 modification according to the criteria in 40 CFR 270.42, the modification to the plan will be approved in accordance with the procedures in 40 CFR 265.112(d)(4).

2.5.5 Closure Certification Procedures

Closure certification procedures and requirements are discussed below.

2.5.5.1 Submittal of Closure Plan and Certifications

All copies of the closure plan, certification, and any revisions (one with original signatures) should be submitted to the address below.

Section Chief
Hazardous Waste Permit Section
Office of Land Quality
Indiana Department of Environmental Management
100 North Senate Avenue
P. O. Box 6015
Indianapolis, IN 46206-6015

2.5.5.2 Signatory Requirements

The closure plan application, revisions, and reports are subject to the signatory requirements of 40 CFR 270.11. The application must be signed as follows:

1. For a corporation, by a responsible corporate officer defined as follows:

    a. A president, vice president, treasurer, or secretary of the corporation in charge of a principal business function or any other person that performs a similar policy or decision-making function for the corporation, or

    b. The manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures

2. For a partnership or sole proprietorship, by a general partner or the proprietor, respectively

3. For a municipality, state, federal, or other public agency by either a principal executive officer or ranking elected official defined as follows:

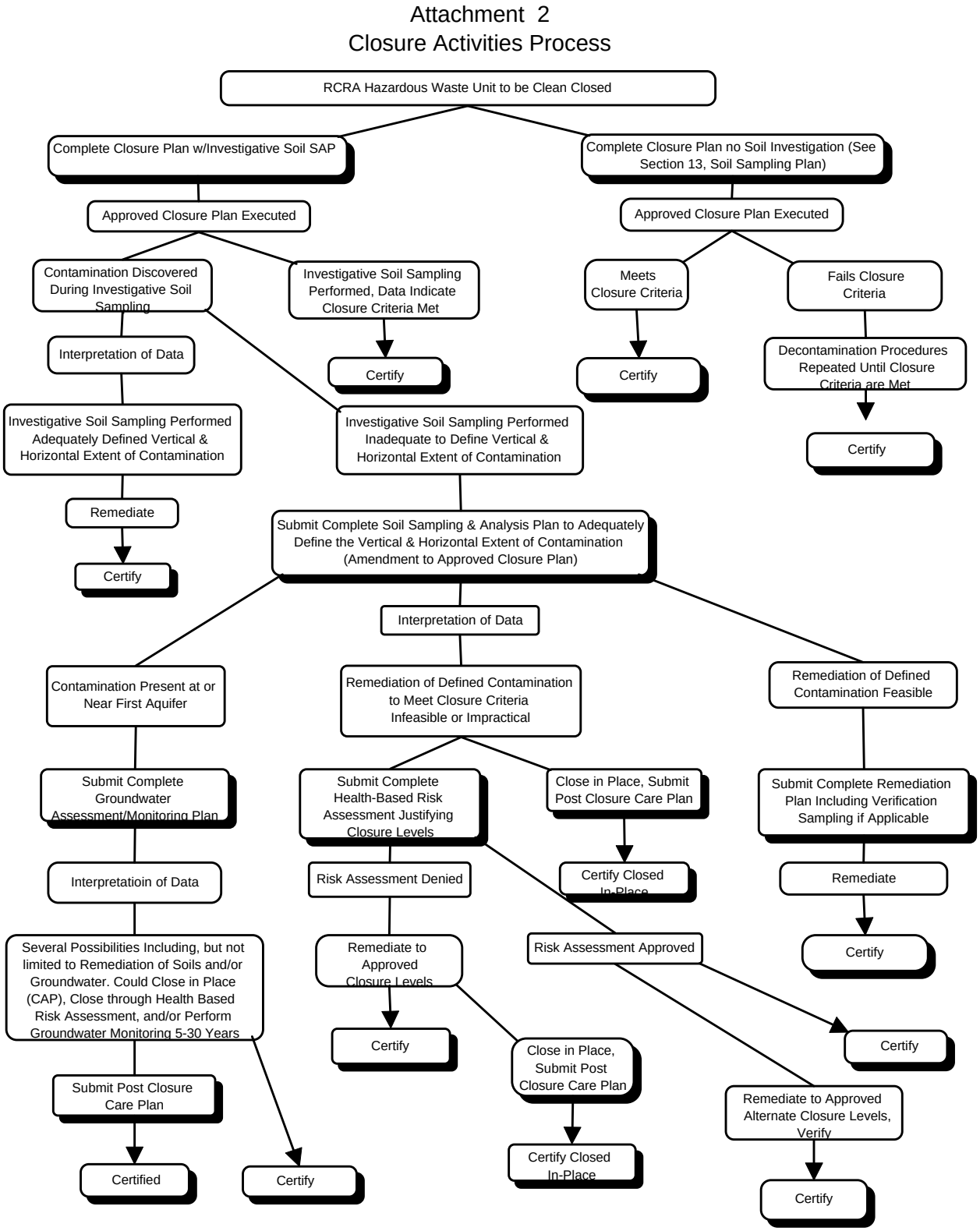
   a. The chief executive officer of the agency, or

   b. A senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (for example, U.S. EPA regional administrators)

A duly authorized representative can also sign the application, but a written authorization must be signed by the appropriate officer as defined above, and the authorization must be on file with IDEM.

The Closure Plan Certification Statement in Appendix 2.1 should be signed. At least one of the copies of the certification submitted to IDEM must have original signatures. Certification of closure constitutes a report as defined by 40 CFR 270.11(b). Therefore, the certification must conform with associated signatory requirements. The certification must be signed by the officer described in this section as well as a registered professional engineer (see "Certification of Closure" below).

Figure 2-1. Closure Activities Process



2.5.5.3 Certification of Closure

All partial or total closures of hazardous waste management units must be certified by both the owner and operator and an independent registered professional engineer in accordance with 40 CFR 264.115 and 265.115. Certification is due 60 days after completion of closure activities and no more than 240 days from the date of closure plan approval (unless otherwise approved).

The independent engineer should be present during all critical, major closure activities. The independent engineer or the facility owner or operator may be required to notify IDEM in advance of any critical closure activity. These activities can include soil sampling, remediation, final cover placement, and other events. The frequency of inspections by the independent engineer should be sufficient to determine the adequacy of each critical activity. The responsibilities of the certifying engineer during closure are discussed in the preamble of the May 2, 1986, *Federal Register* amending the closure and post-closure requirements of 40 CFR Parts 264 and 265.

A closure report should be submitted with the Closure Certification Statement (see Appendix 1.4). This report should include, but not be limited to, the following information:

1. Volume or weight of waste and waste residue removed
2. Method of waste handling and transport
3. Waste manifest numbers or copies of manifests from waste removal and waste residues
4. Sampling and analytical methods used
5. Chronological summary of closure activities
6. Closure costs
7. Photographic documentation of closure
8. Analytical results

All analytical results must include the information listed in Section 2.8.3 in order to be validated by IDEM. For partial closures, revised cost estimates for remaining closure activities and any affected financial assurance instruments should be submitted with the closure certification documents. If the certification is for total closure, the certification documents should include a request for release from financial assurance.

A completed Closure Certification Statement (Appendix 2.2) should be included with the certification report.

2.5.5.4 Status of Facility after Closure

The closure plan (Appendix 1.4) and Closure Certification Statement (Appendix 2.2) should clearly state the status of the hazardous waste facility after closure is completed. For example, the plan and certification should state if a storage facility is to be operated as a generator (less than 90-day accumulation). The plan should also describe whether closure is partial or total. If closure is partial, the plan or certification should name both the units covered by the closure plan or certification as well as units remaining in operation or covered by the permit. The plan or certification should indicate whether the facility will continue to be permitted or if the facility status would be changed to a generator or transporter (if applicable).

The plan or statement should also indicate which of the statements presented below describes the intended use of the facility.

1. The facility will continue to be permitted.
2. No TSD activities will occur at the facility.
3. The facility will continue to treat or store hazardous wastes under interim status requirements.
4. The facility will be a small-quantity generator of less than 1,000 kilograms per month of hazardous waste and accumulate the hazardous waste on site for less than 90 days.
5. The facility will generate more than 1,000 kilograms per month and will accumulate the hazardous waste on site for less than 90 days.
6. The facility will generate more than 100 kilograms per month, but less than 1,000 kilograms per month and accumulate the hazardous waste on site for less than 180 days (or 270 days, if applicable).
7. The facility will be exempt from TSD regulation under RCRA.
8. The facility will be a transporter of hazardous waste.

2.5.5.5 Part A Permit Modification and Withdrawals

This discussion applies only to facilities with permits or interim status. This discussion does not apply to facilities that are required to close by an enforcement action or other means and that did not have interim status.

The facility's Part A permit application must be revised in accordance with 40 CFR 270.71 when closure certification is submitted. Responsibility for a closed unit cannot be terminated completely upon closure. In the case of total closure that requires no post-closure care, the owner/operator should submit a letter requesting withdrawal of the Part A permit application to the IDEM, along with their closure certification.

For partial closure, a revised Part A permit application must be submitted to include only the remaining units and, if necessary, a corrected copy of the existing Part A permit. A cover letter discussing the closure and explaining the changes should also be included. Facilities should modify Part B permits in accordance with the requirements specified in 40 CFR 270.42.

2.6 Closure Options

Closure can be achieved in two ways:
1) by removal or decontamination, or
2) in-place.

Closure by removal or decontamination can be achieved in two ways:
1) clean closure, or
2) risk-based closure.

Clean closure levels are established as background levels or EQLs for the constituents set forth in 40 CFR 261, Appendix VIII. Risk-based closure is based on a default or non-default risk assessment that uses exposure assumptions consistent with the land use (i.e. residential or industrial). Table 2-1 below summarizes closure options.

Table 2-1. Summary of Closure Options

Closure Types	*Removal or Decontamination*			*Closure In-Place*	
	Clean	*Residential*	*Industrial*	*Contamination in Place (waste removed)*	*Land Disposal Units (waste remains)*
Closure Levels	*Background or EQL*	*RISC Default or Non-default*	*RISC Default or Non-default*	*Site Specific*	*NA*
Post Closure Activities	*None*	*None*	*None**	*See Section 2.6.3.1*	*See Section 2.6.3.2*

**** A restrictive covenant with land use and/or activity controls required***

2.6.1 Closure by Removal or Decontamination

2.6.1.1 Decontamination Procedures

Before decontamination, all paved areas, concrete pads, containment systems, structures, and sumps should be visually inspected to identify any cracks, gaps, spills, stains, or damaged areas that may be present. This visual inspection should be documented in the closure certification report with notations of any identified problems. Any cracks, gaps, or damaged areas should be repaired by grouting or sealing before decontamination is performed in order to prevent the further release of contamination into underlying soil.

Decontamination of paved areas, containment systems, and sumps should include the following:

- Visual inspection
- Waste removal

- Mechanical cleaning (scraping or sweeping)
- Repair of damaged or unsealed areas
- Low-volume, high-pressure washing (can include steam or detergent for more effective cleaning)
- Three successive low-pressure ambient-temperature water rinses
- Sampling and analysis of final rinsate to confirm decontamination

The first two water rinses described above should remove both residual wastes and any detergents used during washing. The third or final rinse should provide the source of verification samples. Verification of decontamination must be provided to confirm that closure levels have been met.

At least two samples of the final rinsate from each unit undergoing closure should be analyzed for the hazardous constituents identified in the waste as defined in 40 CFR 261, Appendix VIII, or for hazardous waste constituents as defined in 40 CFR 260.10. The two rinsate samples are field duplicates for the rinsate. The final rinsate samples should be representative of the entire final rinse. Rinsate samples to be analyzed for metals should be filtered to remove solid particles prior to sample preservation. Whenever applicable, procedures for minimizing loss of volatile organic compounds (VOC) during sampling should be described in the closure plan.

Minimum closure levels for the rinsate that should be achieved for closure by removal are discussed further in Section 2.9.1.2 below. Decontamination procedures will be repeated until closure levels are met. If closure levels are not met after two iterations of decontamination procedures, IDEM will provide further guidance. Specific decontamination procedures for typical closure by removal projects are discussed below.

Decontamination of Equipment, Structures, and Pads

In accordance with 40 CFR 264.114 and 265.114, the closure plan should describe all efforts to (1) remove hazardous waste, its residues,

and hazardous waste constituents from tanks or (2) decontaminate paved areas, concrete pads, containment systems, equipment, structures, pipes, pumps, sumps, and any other appurtenances to the hazardous waste management unit. IDEM may request the owner or operator to use any reasonable means to clean or decontaminate the unit and its ancillary equipment, including scraping, pressure washing, solvent washing, and other means. Any equipment, including heavy earth-movers or small tools, should be scraped and washed to remove waste residues. These residues should be managed as hazardous waste, and the procedure for cleaning and managing them should be described in detail in the closure plan.

Storage pads should be decontaminated in accordance with the procedures specified in 40 CFR 264.112(b)(4). A typical pad decontamination procedure is presented below.

1. All wastes are removed from the pad and appropriately disposed of.

2. The pad is mechanically cleaned by scraping, sweeping, or other methods to remove all physical contamination.

3. The pad is inspected for cracks. If cracks are detected, items 10 and 11 may be performed at this point.

4. The cracks are sealed.

5. The pad is washed using a high-pressure steam cleaner with detergent or appropriate solvent to remove previously stored waste materials.

6. The pad is rinsed three times with water. Low-pressure, ambient-temperature rinses should be used.

7. The third (final) rinsate is collected separately, and two samples are analyzed to show that the pad's surface meets closure levels. For inorganic and certain organic parameters, closure levels will be based on the MCLs of the National Primary Drinking Water Regulations (40 CFR 141) in the rinsate. For organic parameters without MCLs, the closure levels of the rinsate will be based on the EQLs of the analytical methods as defined in SW-846. Analytical parameters will be based on wastes previously stored in the area.

8. Care is taken to prevent the migration of cleaning liquids from the pad area.

9. All residues and rinsates are collected and disposed of as hazardous waste unless the residues and rinsates are analyzed and determined to be non-hazardous.

10. Soil underlying cracks discovered during visual inspection is sampled for contamination. If contamination is found, the vertical and horizontal extent of the contamination should be determined. Closure levels for soil are based on background levels for inorganic parameters and the EQLs of the analytical methods as defined in SW-846 for organic parameters, or the RISC closure levels. Background levels for inorganics are determined by sampling soil borings in four locations known to be located in an area unaffected by facility operations. Each boring will be sampled at the same depth intervals as the soil samples collected from under the pads. The 95% upper confidence limit (UCL) of the mean is calculated to be the cleanup level for each inorganic parameter for each pad depth interval.

11. Soil that does not meet cleanup levels is remediated or removed.

12. The pad is cleaned until closure levels have been met.

Tank Decontamination Procedures

Tanks containing hazardous waste are subject to all reasonable means of decontamination in order to meet closure levels. Procedures for decontamination include manual sludge removal, pressure or solvent washes, rinses, and other procedures. An independent, registered professional engineer should certify the methods used and that the level of decontamination is appropriate for each tank's final disposition (for example, disposal as a hazardous waste or storage of product). Tanks that will be reused after closure for product storage or storage of a different hazardous waste, and tanks to be dismantled for scrap metal, require decontamination. Tanks to be dismantled and disposed of as hazardous waste may not require decontamination but are subject to Land Disposal Restrictions (40 CFR 268). Some tank

closures require a contingent post-closure care plan (see 40 CFR 264, Subpart J, and 40 CFR 265, Subpart J).

Tanks that will be used for accumulation (not to exceed 90 days) of the same hazardous waste following closure should be drained, all visible contamination removed, and the tank inspected. Owners and operators of existing tank systems that will be used to accumulate hazardous waste should be aware of the assessment requirements in 40 CFR 262 and 265.191.

Underground tanks containing ignitable wastes should be removed in accordance with State Fire Marshall regulations, and underlying soil should be sampled for the hazardous waste constituents stored in the tank. Tanks containing non-ignitable hazardous waste can be abandoned in-place if they are properly decontaminated, filled, and capped, and soil testing verifies the absence of soil contamination. Soil sampling requirements are discussed in Section 2.9.

Sampling and analysis of the final rinse is required in order to confirm that closure levels have been met for tanks that are to be used after closure to store product or different hazardous waste. At least two samples of the final rinse should be analyzed for the hazardous constituents or hazardous waste constituents identified in the stored waste. The two rinsate samples are field duplicates for the rinsate. The final rinsate samples should be representative of the entire final rinse. When applicable, procedures for minimizing loss of VOCs during sampling should be described in the closure plan.

Decontamination procedures should be repeated until closure levels are met.

Care should be taken to prevent the migration of cleaning liquids from the containment area. All wash and rinse waters should be collected and managed as hazardous waste unless analysis shows that they are non-hazardous. The closure plan should describe how decontamination waste material (rinse water, decontamination equipment, personal protective equipment, and other materials) will be managed. An estimate of the volume of waste material to be generated should also be provided. Residues from listed hazardous waste must be managed as hazardous waste unless they are de-listed under the provisions of 40 CFR 260.22 or covered by the exemption of 40 CFR 261.4.

The tanks should be decontaminated in accordance with the procedures specified in 40 CFR 264.112(b)(4). A typical tank decontamination procedure is presented below:

1. All wastes are removed from the tank.

2. The tank is mechanically cleaned by scraping, sweeping, or other methods to remove all physical contamination.

3. The tank is washed using a high-pressure steam cleaner with detergent or appropriate solvent to remove previously stored waste materials.

4. The tank is rinsed three times with water.

5. The third (final) rinsate from each tank is collected separately, and two samples are analyzed to show that the tank meets closure levels. For inorganic and certain organic parameters, closure levels will be based on the MCLs of the National Primary Drinking Water Regulations (40 CFR 141). For organic parameters without MCLs, the closure levels will be based on the EQLs of the analytical methods as defined in SW-846. Analytical parameters should be based on wastes previously stored in the tank.

6. Care is taken to prevent the migration of cleaning liquids from the tank area.

7. All residues and rinsates are collected and disposed of as hazardous waste unless the residues and rinsates are analyzed and determined to be nonhazardous.

8. The tank is cleaned until closure levels are met.

2.6.1.2 Soil Remediation

The closure plan for any facility attempting closure by removal must fully describe (1) each step taken to remove waste from the units and contaminated soil from the surrounding areas or (2) each method proposed for remediation of contaminated soil.

For removal, the plan should include a description of solidification/

stabilization, accumulation of waste or reagents, equipment used, the soil removal pattern and excavation depth increments, loading areas, and any other information critical to soil removal. The plan should clearly discuss how soil will be removed, accumulated, loaded, and managed once it leaves the site. Covered and lined roll-off containers are recommended for accumulating and removing hazardous wastes. Accumulating contaminated soils on the ground is ill-advised, as this may constitute an illegal hazardous waste pile. The plan should describe backfill materials to be used. Analysis of backfill material should document that the backfill does not exceed land-use specific closure levels or otherwise violate the assumptions of the risk assessment.

Alternatively, soil containing certain hazardous waste constituents can be remediated to closure levels and allowed to remain in the unit or be placed back into the unit. Bio-remediation and soil vapor extraction of organic constituents are examples of soil remediation processes. A complete remediation plan is required to be submitted for IDEM review as a proposed modification to the approved closure plan.

The remediation plan should include the following:

- Detailed description of treatment process(es)
- Justification of applicability and feasibility of this process to this site (including discussion of site conditions and contaminants)
- Schedule of activities
- Expected timeframe to meet closure levels
- Periodic testing to verify progress
- Periodic status reports indicating progress made
- Sampling (locations and depths) and analysis procedures for periodic and final verification
- Final verification sampling and analysis to confirm complete remediation to closure levels

In addition, the remediation plan should discuss efforts to minimize air emissions, including volatiles and dust, when applicable.

A registered professional engineer should certify engineering studies and design drawings related to the remediation plan.

2.6.2 Industrial Closure

In order to provide consistency across program areas and to implement the principles of RISC, OLQ will use the approach discussed below to accept closure certification for hazardous waste management units, or to determine that no further action is required for SWMUs and AOCs. This approach is to be used at facilities where the owner or operator chooses to close to industrial levels through a risk-based decision process.

As the name implies, Industrial Closure is to be used only in locations which have been, and will remain, industrial. As addressed in the RISC Technical Guide, closure plans may use non-default risk assessments to determine site-specific industrial closure levels. Future land use and exposure assumptions must be made in the preparation of the risk assessment. Industrial areas will allow higher closure levels than residential areas, therefore, a specific set of criteria must be met to ensure that future land use and exposure assumptions used in the risk assessment remain valid.

Engineering controls are not allowed for industrial closure.

2.6.2.1 Industrial Closure Requirements

After the removal of all waste and liners, a risk assessment based on closure levels for an industrial facility can be conducted. The risk assessment evaluates the levels of hazardous constituents that remain in the soil and groundwater, and insures that the default or non-default land-use appropriate closure levels are achieved. After approval of the risk assessment, the facility can certify closure. In order for the closure certification to be accepted, the facility must maintain land use or activity restrictions, consistent with the approved risk assessment, through either a restrictive covenant or other approved mechanism (see Appendix 5 of the RISC Technical Guide). Once the site restrictions have been implemented and other elements of the approved closure plan have been successfully accomplished, the closure certification will be accepted.

The nature and extent of contamination in soil and ground water must be determined for all facilities using industrial closure levels. Facilities with multiple sources may follow the procedures described in the RISC Technical Guidance, Section 4.1, p. 4-1. In addition, ground water contamination associated with the facility must be below the default or approved non-default industrial levels at the perimeter of compliance and below the default residential levels at areas beyond the point of property control. This can be demonstrated by proving plume stability. Compliance schedules associated with these requirements will be determined in the closure plan. If at any time land-use specific closure levels are exceeded, remediation or corrective action must occur. Failure to remediate or implement corrective actions could result in an enforcement action.

If any waste or liners remain in place, or if waste and liners have been removed but contamination in excess of industrial closure levels remains in-place, either remediation, corrective action and/or appropriate engineering controls will be required. The unit is not eligible for industrial closure and must be closed in-place. A hazardous waste management post-closure permit or other enforceable document is then required. The presence of hazardous constituents at levels below the land-use appropriate closure levels does not constitute waste or contamination remaining in place.

Industrial closure can be obtained by performing remediation (for example, excavation and hauling, soil vapor extraction, or other form of remediation) for areas exceeding industrial closure levels. Once the industrial levels are met (again, based on the additional confirmation sampling and analysis plan [SAP]), the owner/operator may certify that the unit meets the industrial closure scenario.

The only restriction that must remain in effect after achieving industrial closure is to file a restrictive covenant consistent with the approved risk assessment. Such a restrictive covenant might include (1) a land use restriction (e.g. the property cannot be used for residential purposes), and/or (2) activity restrictions, if applicable (e.g. groundwater at the site cannot be used for residential consumption). In these cases, the facility must record in the local recorder's office a restrictive covenant that provides the appropriate land use and activity restrictions. No post-closure requirements, such as those applicable to land disposal units, would apply.

Future use of property subject to an industrial closure must be consistent with the exposure assumptions underlying the risk assessment. Property subject to industrial closure can be used for any legitimate future industrial use so long as the land use and exposure potential are consistent with the land use and exposure assumptions approved in the risk assessment.

2.6.2.*2* Summary of Requirements for Industrial Closure

1. The approved closure plan must be successfully completed.

2. The owner or operator performing the industrial closure must record an appropriate restrictive covenant on the property deed concerning the industrial land-use restriction. A title reference must be provided. The portion of the property covered by the deed restriction must be clearly delineated on a survey plat.

3. Owners of the property after the restrictive covenant is recorded must:
   a. comply with the terms of the covenant, and
   b. notify future buyers that the facility's use is limited and must be consistent with the terms of the restrictive covenant.

4. Before the land use can change, the owner or operator at the time the change is proposed must demonstrate that the remaining constituents meet levels consistent with the proposed use of the property. If IDEM agrees with the demonstration, the restrictive covenant may be amended or terminated to reflect current conditions.

If an owner/operator does not comply with the terms of the restrictive covenant, that owner/operator is subject to enforcement action in accordance with IC 13-14-2-6.

2.6.2.3 Notices

Sites that are closed to industrial levels are required to record a ***restrictive covenant*** in the local recorder's office. This recorded document notifies future landowners that the property meets industrial health-protective levels but is not suitable for residential use and residential activities.

Within 60 days of certification of closure of the hazardous waste management unit, the owner or operator must record, in accordance with State law, a restrictive covenant that will notify any potential future purchaser of the property that the property has been used to manage hazardous wastes and that certain restrictions apply to its use. The owner or operator must also submit to IDEM a certification signed by the owner or operator that the notation has been recorded, including a copy of the document in which the notation has been placed (see 40 CFR 264.119 and 265.119).

If in the future the owner/operator wishes to demonstrate that the levels of constituents left in place meet the residential closure levels, a supplemental sampling and analysis plan for verification sampling must be sent to the IDEM for approval. A separate closure certification must then be submitted, stating that the verification sampling now indicates that the site meets residential closure levels. Following IDEM acceptance of the revised closure certification, the restrictive covenant may be amended or terminated.

2.6.3 Closure in Place

2.6.3.1 Closure with Contamination in Place

In some cases, after the waste or liners are removed, contaminants may remain which exceed land-use specific closure levels. In these cases, the closure is not considered a closure by removal or decontamination, but is considered a closure in place. Where engineering controls or physical barriers (i.e. something more than a restrictive covenant) are needed to meet the land use specific closure levels, an enforceable document is needed to ensure that the engineering control or physical barrier remains in place.

Limited post-closure care may be warranted, dependent upon the facts and circumstances of each case. In some cases, physical engineering controls (e.g. caps, fences, buildings) must be maintained to ensure that the land use and exposure assumptions made in the approved risk assessment remain valid. In other cases, appropriate groundwater monitoring schedules may need to be established. In these cases, the details and duration of the facility's post-closure requirements (stipulated in an order or post-closure permit) could be tailored to the specific facts and engineering controls being utilized. In some situations, it may be appropriate to combine monitoring or other features with other closure or corrective action activities at the facility. For example, the monitoring of a particular unit may be combined in some circumstances with an overall program in corrective action.

Facilities utilizing engineering controls to prevent exposure will require an order or post-closure permit which will include the stipulation that the control must be maintained appropriately and if damaged or rendered ineffective, must be repaired or replaced with other effective controls.

2.6.*3.2* Closure In-Place - Land Disposal

Any unit where waste is to be left in place (such as landfills, tanks unable to achieve clean closure, waste piles, and surface impoundments to be closed as landfills) has several additional important considerations beyond those required for closure by removal or decontamination. These considerations include liners, final cap cover, vegetation, ground water monitoring, post-closure care, and permit requirements.

Full descriptions and detailed engineering drawings are required for each unit undergoing closure in-place. Details of liners, drainage layers, covers, vegetation, wells, final contours, construction QA, or any relevant structures or practices should be provided. A registered professional engineer should certify engineering studies and design drawings and specifications.

Several additional regulatory requirements for closed disposal units are specified in 40 CFR 265.197, 265.228, 265.280, and 265.310 for facilities. The requirements concern ground water monitoring, post-closure plans, post-closure care, notice to local land authority, and notice in the deed to property. More information on groundwater monitoring requirements is presented in 40 CFR 264 Subpart F and 265 Subpart F, and more information on post-closure care and notices is presented below.

2.6.3.3 Post-Closure Care

The closure plan for any disposal unit must include a post-closure care plan in accordance with 40 CFR 265.117. For land disposal units that close after May 19, 1981, an application for a post-closure care permit must be submitted upon request from IDEM. Tank systems that do not have secondary containment must follow the procedures for post-closure care outlined in 40 CFR 265.197.

2.6.3.4 Location Documentation for Disposal Units

There are three notification requirements for facilities that close units in place with post-closure care. First, 40 CFR 265.116 states that at no later than the submission of the certification of closure of each hazardous waste disposal unit, an owner or operator must submit to the local zoning authority or county land-use authority and the IDEM Commissioner a survey plat indicating the locations and dimensions of landfill cells or other hazardous waste disposal units with respect to permanently surveyed benchmarks. This plat must contain a note indicating the owner's or operator's obligation to restrict disturbance of the hazardous waste disposal unit in accordance with 40 CFR Part 265, Subpart G, regulations.

A copy of the survey plat and a copy of the document with the notation required by 40 CFR 265.116 must also be provided to the IDEM along with the closure certification.

Second, 40 CFR Part 265.119(a) states that within 60 days of certification of each hazardous waste disposal unit, the owner or operator must submit to the zoning authority or county land-use authority and the IDEM a record of the types, locations, and amounts of hazardous wastes disposed of within each cell.

Third, 40 CFR Part 265.119(b) states that within 60 days of certification of closure of the first and last hazardous waste disposal units, the owner or operator must record a notice in deed that the land was used to manage hazardous waste and must not be disturbed, and certify that this information was recorded and a copy of the information sent to the IDEM.

2.6.3.5 Certification of Completion of Post-Closure Care

Within 60 days after the completion of the established post-closure care period for each hazardous waste management unit, a certification must be submitted to IDEM that the post-closure care period for the hazardous waste unit was performed in accordance with specifications in the approved post-closure plan. The certification must be signed by the owner or operator and an independent, registered professional engineer. Documentation supporting the independent registered professional engineer's certification must be furnished to IDEM upon request until the owner or operator is released from the financial assurance requirements for post-closure care under 329 IAC 3.1-14 or 15.

2.7 RCRA Corrective Action Process

Facilities seeking a TSD permit and facilities that formerly operated as TSDs that released hazardous constituents must fulfill certain Corrective Action requirements, in accordance with Indiana Code 13-22-2-5(6) and 13-22-13-1. IDEM may initiate Corrective Action either through the RCRA permit, if applicable, or through an order. Alternatively, facilities may choose to address Corrective Action obligations voluntarily (for example, through either an agreed order or the VRP with accompanying order). Regardless of how a facility enters corrective action, the goals are the same—facility-wide assessment for the presence of released hazardous waste and/or

hazardous constituents followed by a demonstration that any such release at or from the facility does not pose unacceptable risks to human health or the environment.

The Corrective Action process consists of five basic elements:

- Potential source identification
- Release assessment
- Release investigation
- Evaluation and selection of appropriate remediation technology or technologies
- Remediation of release(s)

These elements typically occur, to some degree, during most cleanups. They should be viewed as evaluations needed to make good cleanup decisions, not necessarily individual steps through the process. All five elements are briefly described below. Specific details are provided in the "Corrective Action Scope of Work," which is available from IDEM.

Either a default or non-default risk assessment can be performed after either the release assessment or the release investigation, or upon completion of remediation activities. Upon satisfactory completion of corrective action requirements, IDEM will issue an acknowledgment that no further action (NFA) is required for the unit at this time. Closure under the RISC Technical Guide can be used to demonstrate that the unit has attained no further action status.

IDEM recognizes recent reforms by the U.S. EPA to "streamline" Corrective Action. For facilities that meet EPA's qualifying criteria, the IDEM will incorporate a streamlined Corrective Action process into permits and orders. In accordance with the streamlined approach, IDEM emphasizes that the details contained in the Corrective Action Scopes of Work referred to above should not be considered boilerplate provisions applicable to every site, but rather a menu of possible activities that may be appropriate for a particular facility or corrective action evaluation. Similarly, facility owners and operators are encouraged to pursue interim corrective measure and presumptive remedies to accelerate the process of environmental improvement.

2.7.1 Potential Source Identification

During this stage of the process, the entire facility is evaluated for its potential to release hazardous wastes and hazardous constituents into the environment. The potential source identification is similar to the pre-sampling discussed in Chapter 2 of the RISC Technical Guide. This evaluation is commonly referred to as the RCRA facility assessment (RFA). If the RFA reveals that the potential for releases exists or existed, a current conditions report is required for the facility that includes the following information:

- A summary of the facility's background, including the historical use of the facility and all known locations where solid or hazardous wastes were managed**,** regardless of when they were in use

- A description of the known nature and extent of any contamination, including available monitoring data, potential migration pathways, and potential receptors

- A description of any measure that was or is being undertaken to mitigate any risks to human health or the environment

2.7.2 Release Assessment

Release assessment is the first of two steps in the Corrective Action RCRA facility investigation (RFI) process. The default procedures for this assessment follow the screening procedures described in Chapter 3 of the RISC Technical Guide**.** This assessment normally requires a work plan submitted for IDEM approval, unless IDEM has approved an alternate approach. Two additional requirements apply to the release assessment beyond those presented in Chapter 3 of the RISC Technical Guide. First, the owner/operator must submit a community relations plan (CRP). The CRP will describe how the community will be kept apprised of conditions and ongoing work at the facility. Secondly, if an imminent threat to human health or the environment is discovered during the release assessment, interim measures are required to abate the threat.

2.7.3 Release Investigation

Release investigation is the second of two steps in the RFI process. It is similar to characterization of the nature and extent of contamination discussed in Chapter 4 of the RISC Technical Guide. However, the owner/operator should refer to this chapter's Sample Quality Assurance and Analytical Requirements, RCRA Soil Sampling, and RCRA Ground Water Evaluation sections for guidelines that are used in the RCRA program. Results of the release investigation and release assessment are usually presented in an RFI report.

2.7.4 Evaluation and Selection of Appropriate Remediation Technology

Upon IDEM's approval of the results of the release investigation, IDEM may require the evaluation of remediation technology alternatives. This evaluation is commonly referred to as a corrective measures study (CMS). The CMS's objective is to ensure that any technology ultimately selected will be capable of effectively achieving timely closure. The technology or technologies will also be evaluated for cost-effectiveness. It is important to note that "cost-effective" does not necessarily mean the least costly.

Evaluation of appropriate remediation technologies need not be a lengthy process. A presumed remedy (that is, a known, proven remedy) that meets the effectiveness and timeliness criteria can be proposed to IDEM. Regardless of how the potential remedy is chosen, its proposal must be made available for public comment.

2.7.5 Remediation of Releases

Upon termination of the public comment period, IDEM will select the remedy or combination of remedies to be implemented. Under the Corrective Action process, this element is called "Corrective Measures Implementation." Once the remedy is selected, the owner or operator must demonstrate financial assurance through one or more of the following mechanisms:

- Trust fund
- Surety bond guaranteeing performance

- Letter of credit
- Financial test
- Corporate guarantee

Insurance and surety bonds guaranteeing payment into a standby trust fund are not acceptable mechanisms (see 55 FR 30856, July 27, 1990).

2.7.6 "No Further Action" Status

For SWMUs and AOCs, there are two ways of achieving no further action at this time (NFA) status: either remediation of any releases to background concentrations or demonstration that the concentrations of contaminants remaining will not pose threats to human health or the environment.

2.7.6.1 Remediation to Background Concentrations

No further action at this time under this scenario requires investigation of releases from SWMUs and AOCs and remediation to background levels (or EQLs for organic compounds) of any media contaminated by a SWMU or AOC.

2.7.6.2 Demonstration of Insignificant Threats to Human Health and the Environment

No further action at this time under this scenario requires investigation of releases from SWMUs and AOCs and evaluation of the collected data using appropriate risk assumptions to verify that no media present threats to human health and the environment. Remediation of affected media may be necessary to meet the concentrations established by the risk assessment.

For any risk assessment that uses an industrial exposure assumption, the owner or operator must record a restrictive covenant on the affected property's deed (see IC 13-25-4-24), which limits the use of the property and/or the activities at the property consistent with the approved risk assessment. Additional requirements are discussed in Appendix 5 of the RISC Technical Guide.

2.8 Sample Quality Assurance and Analytical Requirements

The sample QA and analytical requirements apply to the soil and ground water sampling discussed in Sections 2.9 and 2.10 of this User's Guide. SAPs, sample QA, and analytical requirements are discussed below.

2.8.1 Sampling and Analysis Plans

An adequate SAP should include, at a minimum, the following information:

1. Media to be sampled
2. Parameters to be analyzed
3. Sampling locations and depths
4. Background boring locations and depths for inorganic parameters (if applicable)
5. Soil boring methods, sample collection methods, and sampling equipment
6. Procedures and equipment used to minimize volatilization in samples submitted for organic analysis
7. Sample preservation techniques and containers
8. Equipment decontamination procedures
9. Analytical procedures used to achieve EQLs
10. Statement indicating closure levels
11. Sample chain-of-custody control procedures, including shipping procedures
12. A copy of the form that will be used to record and document soil descriptions and sampling information in the field

The form identified under item 12 above should include the following information:

1. Facility or unit
2. Purpose of sampling
3. Sampling date and time
4. Weather conditions
5. Field personnel
6. Sampling method and equipment
7. Boring, test pit, or well location and identification (ID) number

8. Soil mapping unit determined from the appropriate county soil survey published by USDA's SCS
9. Sample number
10. Sampling interval and depth
11. Monitoring well static water level
12. Monitoring well purging procedure
13. Ground water field measurements (such as pH, specific conductance, and temperature)
14. USDA soil textural classification from the following reference: USDA. 1962. *Soil Survey Manual*. Handbook No. 18. U.S. Government Printing Office. Washington, DC.
15. Lithology
16. Munsell soil color from the following reference: Munsell Color. 1975. *Munsell Soil Color Charts*. Baltimore, MD.
17. Sedimentologic features
18. Miscellaneous observations
19. Evidence of contamination (such as discoloration, odor, or field instrument results)

Facilities are strongly advised to perform continuous soil borings and record descriptions in accordance with IDEM's Unconsolidated Descriptive Requirements.

2.8.2 Sampling Quality Assurance

Sampling methods and equipment used should follow guidance in U.S. EPA's "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (SW-846) and U.S. EPA's "RCRA Ground-Water Monitoring Technical Enforcement Guidance Document" (OSWER Directive No. 9950.1, Final, 1986). Field sampling methods not included in SW-846; 40 CFR 261, Appendix I; or the technical enforcement guidance document must be approved by OLQ before use. These methods include drilling, boring, and other sampling methods. When available, standard procedures as defined by U.S.EPA, IDEM, or the American Society for Testing and Materials (ASTM) should be followed.

IDEM recommends using the Data Quality Objective (DQO) process for all sampling and analysis performed in support of RISC. DQO's establish the type, quality and quantity of data required to make and defend a particular decision. See Section 3.2.1 of the Technical Guide for information on the DQO process. IDEM highly recommends

collecting the various types of quality assurance samples. Each QA sample documents specific aspects and provides information about accuracy or precision throughout the sampling process. Proper decisions cannot be made without appropriate QA samples, and analytical results will be considered to be estimated, attributed to the sample, or may not meet the project DQO.

For each batch of 20 samples or less, IDEM recommends at least one field duplicate per matrix type must be collected. Control samples such as trip blanks (when VOC's are chemicals of concern) or equipment blanks (to demonstrate field decontamination procedures) should be collected for each day that samples are collected. In addition, for each batch, sufficient sample amounts must be collected of each matrix to allow the laboratory to prepare one matrix spike and either one matrix duplicate analysis or one matrix spike duplicate per analytical batch when appropriate for the method. The purpose of matrix spikes is to determine bias resulting from the sample matrix. Therefore, the spiked sample must be from the same project as the field samples. If the spiked sample is not from the same project, analytical results must be flagged as estimated. Samples identified as blanks do not meet the purpose of a spike and must not be spiked.

Samples collected for VOC analyses require specialized sampling and handling procedures. Soil samples should be collected with a split-spoon sampler or a sampler that uses removable liners made of stainless steel or some other material acceptable to the laboratory. IDEM recommends Indiana modified method IN-5035M for collecting soil samples for VOC analysis. Preparation, decontamination, and sampling procedures should be performed in accordance with SW-846 and U.S. EPA's technical enforcement guidance document. Under no circumstances should soil samples for VOC analysis be mixed, composited, or otherwise aerated.

2.8.3 Analytical Requirements

A complete quality assurance project plan (QAPP) should be prepared to document sampling and analytical requirements. Guidelines for developing a QAPP are presented in Chapter 3 of the RISC Technical Guide as well as SW-846, Chapter 1. Chapter 3 of the RISC Technical Guide also details the data quality objectives (DQO) process. One project objective is that the analytical methods' EQLs meet closure levels. Appendix 2 of the RISC Technical Guide contains guidance on choosing analytical methods that will meet project objectives.

The QAPP should also specify analytical methods for each parameter, sample preparation and extraction methods, and EQLs for each analyte. Guidance for establishing EQLs, which are highly matrix-dependent, is provided in SW-846. The analytical methods in SW-846 should be used whenever possible. Other official U.S. EPA methods applicable for the sample matrix can be used, but any modification to these methods or the use of any other methods will require the submittal of the complete method for OLQ approval. The QA requirements specified in the individual methods must be performed by the laboratory to produce data of acceptable quality.

The use of common field screening instruments, such as combustible gas indicators, colorimetric indicator tubes, and photo-ionization detectors (such as the HNu™ or TIP™), is not an acceptable substitute for SW-846 methods. These screening tools can be used to determine the presence (but not the absence) of hazardous constituents. They are only appropriate and acceptable for screening samples. If portable field instruments are used, the results should be confirmed by laboratory analysis of the samples using SW-846 methods.

Reports that contain analytical results should include the information specified in IDEM's "Hazardous Waste Program: Analytical Data Deliverable Requirements for RCRA Closures, Risk Assessments, Site Assessments, and Remediation Projects." The information is necessary to allow data review and validation.

The document "Guidance to the Performance and Presentation of Analytical Chemistry Data" contains additional guidance on the DQO process, QAPP preparation, and analytical requirements.

2.9 RCRA Soil Sampling

This section discusses soil sampling under the RCRA program, including the following:

- Soil sampling requirements
- Background sampling
- Sampling considerations
- Sampling to determine the nature and extend of contamination

- Closure or verification sampling
- Industrial closure soil sampling

2.9.1 Soil Sampling Requirements

Hazardous waste management units having any evidence or possibility of a release or the potential for migration of a hazardous waste or hazardous constituent (see 40 CFR 261, Appendix VIII) at any time during the life of the unit must be investigated before closure (Chapter 3 of the RISC Technical Guide). Soil, and potentially ground water, should be investigated to determine the presence of hazardous constituents. For Corrective Action purposes, the investigation must evaluate for the presence of hazardous constituents. Investigation is required for container or tank storage areas located on soil, gravel, paved pads, or concrete pads. However, IDEM may, on a case-by-case basis, determine that alternate sampling is appropriate. Sampling should be performed in accordance with the sampling methods listed in 40 CFR 261, Appendix I, or SW-846, Chapter 9.

If soil is found to be contaminated, the closure plan, post-closure care plan, or corrective action provisions, if applicable, may require ground water monitoring to determine the nature and extent of contamination. Ground water monitoring applicable by regulation (40 CFR 264.90 and 265.90) has specific standards, and the closure plan must account for these standards (see Section 2.10 of the User's Guide and Chapter 6.3.3 of the RISC Technical Guide for ground water monitoring requirements).

Constituent evaluation, closure levels, and screening sample locations are discussed below.

2.9.1.1 Constituent Evaluation

Parameters for soil analysis should include elements or compounds of the hazardous wastes, hazardous constituents (40 CFR 261, Appendix VIII), or hazardous waste constituents (as defined in 40 CFR 260.10). The owner or operator or IDEM can propose parameters. For Corrective Action purposes, the initial parameter list is comprised of any hazardous constituent used at the facility, as well as any breakdown product or by-product of a hazardous constituent used at the facility. With sufficient justification, parameters can be eliminated

during SAP preparation. Parameters can also be eliminated depending on sampling results (see Chapter 3 of the RISC Technical Guide).

Parameters should be determined not only based on knowledge of wastes managed at the unit but also on other potential elements or compounds used at the facility that generated the waste. These considerations are similar to those used by U.S. EPA for waste de-listings. For example, soil underlying a surface impoundment containing F006, electroplating wastewater treatment sludge, could also be analyzed for 1,1,1-trichloroethane, a solvent likely to be used at a plating facility. IDEM may also require additional parameters for analysis, such as breakdown products.

2.9.1.2 Closure Levels

Closure requires analysis of final rinsates from the decontamination of pads, tanks, or structures to determine if the waste has been removed. Rinsate analytical results must meet (1) the MCLs of the National Primary Drinking Water Regulations (40 CFR 141 and 40 CFR 264.94[a][2]) for inorganic and certain organic parameters with MCLs and (2) estimated quantitation limits (EQLs) as defined by SW-846 for the organic parameters without MCLs. RISC default closure levels are not appropriate for rinsates because the decontamination demonstration is not based on exposure.

Default closure levels for soil and ground water are listed in the RISC Technical Guide, Appendix 1 Table A. These closure levels are based on appropriate land use.

Closure levels for soil can also be established using the non-default procedures presented in Chapter 7 of the RISC Technical Guide. The alternate cleanup level proposal must document that the constituents left in soil will not adversely impact any other environmental medium (ground water, surface water, or atmosphere) and that direct contact through dermal exposure, inhalation, or ingestion will not result in threats to human health or the environment.

Closure levels for soil can be the analytical methods' EQLs for organic compounds and background levels for inorganic compounds. Background levels for inorganic compounds are calculated as the mean

plus one standard deviation. If the coefficient of variation for the background samples exceeds 1.2, additional sampling may be necessary. (See Section 1.6 of the Technical Guide).

2.9.1.3 Screening Sample Locations

Locations of screening soil borings and samples should be selected to determine with a high level of confidence whether any of the identified constituents are present. Random sampling can be performed using a grid system. Directed sampling using the default procedures specified in Section 3.4.1 and Section 3.4.2 of the RISC Technical Guide should be performed in areas of suspected contamination (such as cracked areas of a containment structure, areas of known spills, and suspected downslope, downwind, or runoff areas of a containment structure).

Other directed or systematic methods (such as sampling at uniform intervals) can be used if warranted on a site-specific basis. These methods may include a circular pattern of sampling around a central point or linear sampling along the drainage way, boundary, or perimeter of a container storage area. Grid sampling and directed sampling can both be used in the same closure plan. Section 3.4.1 of the RISC Technical Guide discusses procedures for choosing sampling locations based on a random grid pattern.

2.9.2 Background Sampling

Determination of background concentrations is only necessary to establish closure levels (for example, when natural soil concentrations exceed closure levels) or to determine the vertical extent of contamination for organics. Section 1.6 of the RISC Technical Guide provides details on background sampling.

All background boring locations should be adequately justified and are subject to approval and modification. Proposed background boring locations must be shown on a detailed map or diagram of the facility. Any deviations from the SAP resulting from problems encountered in the soil or based on knowledge of the area should be adequately justified and will be subject to review. Background soil sample results may also be subject to approval if the concentrations are not typical of local Indiana soil.

2.9.3 Sampling Considerations

The risk assessment process requires developing an overall project goal, developing a conception of the facility (a "conceptual site model"), collecting data (research or analytical) to support or enhance the conceptual site model, and evaluating the results. Physical sampling of the facility is only part of the process. Sampling results may indicate the need to collect further data. The sampling process may go through several rounds requiring planning, data collection, and evaluation. It is possible that the project goal may change when more information becomes available during this iterative process. Throughout the process, the owner or operator should consider what types of sampling will be required to collect the data needed to make a final evaluation.

The RISC site evaluation process is summarized in Table 2-2 below.

Table 2-2. RISC Three-Step Site Evaluation Process

Step	Purpose	Comment
Screening	To determine if additional investigation is needed	Can include judgmental (directed) or random soil sampling as well as ground water screening
Determining Nature and Extent of Contamination	To identify contamination boundaries and amounts	May indicate that remaining constituents pose acceptable risks or that remediation is necessary
Verification of Closure Sampling	To confirm that remediation is complete	Must be repeated until closure levels are met

Area screening is optional. If an area is known to be contaminated, the owner or operator can proceed to determining the nature and extent of contamination or to remediation (for example, excavation of the area). Remediation requires adequate closure verification sampling results.

The owner or operator should consider all media when developing the conceptual site model. The SAP should detail the sampling strategy for each medium and consider several factors such as the waste and its constituents, site conditions, environmentally sensitive areas, soil types, possible preferential pathways to ground water or surface water, depth to ground water, and analytical methods required. The SAP must also consider both surface and subsurface soils as well as possible ground water investigation. Area classification, random and directed sampling, and sampling at specific units are discussed below.

2.9.3.1 Area Classification

Areas are classified as unlikely to be contaminated, known to be contaminated, and possibly contaminated (see Section 3.3.3 of the RISC Technical Guide for details on proper area classification). The sampling strategy may vary based on the investigative area classification.

RISC procedures limit a default risk assessment to a maximum source area of 0.5 acre for subsurface soil. This is the largest area for which default values were calculated. Subsurface source areas larger than 0.5 acre cannot be subdivided and require a non-default risk assessment. The simplest non-default risk assessment procedure for larger source areas is to use a smaller dilution attenuation factor in the equation to calculate a non-default closure level (see Chapter 7 of the RISC Technical Guide). However, for surface soil, the Max and Chen tests can be used at areas larger than 0.5 acre by subdividing the area into 0.5 acre areas. In all cases, both surface and subsurface soils must be investigated.

2.9.3.2 Random and Directed Sampling

The two basic options for soil screening to determine if a site will meet closure levels are random and directed sampling. Random sampling is used to determine if an area that may be contaminated is in fact contaminated and if the contamination exceeds default closure values. Directed sampling is used to determine if areas known to be contaminated exceed default closure values. Section 3.4.1 of the RISC Technical Guide discusses these sampling procedures.

The SAP can propose a combination of random and directed sampling and should describe the sampling strategy, which is subject to IDEM

review and approval. The owner or operator may choose not to screen and proceed to the nature and extent determination or remediation (with adequate verification sampling).

All soil analytical results, regardless of whether sampling is random or directed, must be evaluated against the lower of the direct exposure (surface soil) or migration to ground water (subsurface soil) default value. Although the Max and Chen tests use direct exposure (surface soil) closure levels, the entire soil column must meet the lower of the two values. The higher value can be used only if the owner or operator can validly demonstrate that its use will not result in an unacceptable exposure.

Random Sampling

Random sampling can be used in areas classified as "may be contaminated." Sampling locations can be chosen using a random grid method if there is no evidence of releases. Random samples can be collected based on soil stratigraphy similar to the method discussed in Chapter 3.4.3.2 of the RISC Technical Guide. Each soil stratum must be sampled because random sample results confirm the presence or absence of contamination.

Random sampling results should be statistically evaluated to determine if enough samples have been collected by following the procedures in Chapter 1.6 of the RISC Technical Guide. The 95% UCL for each constituent is calculated and compared to the closure level. If the evaluation of random sample results exceeds appropriate closure levels, the nature and extent of contamination must be determined.

Directed Sampling

Generally, directed sampling should be performed at areas known or suspected to be contaminated, such as in areas of cracks, runoff areas of a containment structure, or areas of known spills. The default procedures discussed in Sections 6.3.1 and 6.3.2 of the RISC Technical Guide should be used during directed sampling. The three borings sampled should be in the area of highest contamination (that is, all three results should be reasonably similar). Anomalous or "outlier" results should also be explained.

For volatile constituents, the average of each constituent of the three soil boring samples is calculated. This value is the "potential exposure

concentration" (PEC) for that constituent. For nonvolatile constituents, use only analytical results from strata that have constituents detected. Calculate the average of each constituent within each boring. This is the PEC. PECs (for both volatile and non volatile constituents) are compared to closure levels. (See Section 3.4.4 of the Technical Guide.) If all PECs for a source area are less than closure levels, the source area is not considered to present an exposure risk for human health. Closure can be certified in this case at this point (assuming there are no groundwater issues). If any PEC exceeds the appropriate closure level, the nature and extent of contamination must be determined. (See Chapter 4 of the Technical Guide.)

2.9.3.3 Sampling at Specific Units

Investigative soil sampling is required for storage areas or tanks located on soil or gravel. Sampling locations can be chosen using the random grid sampling strategy if no areas have evidence of releases. If evidence of a release exists, the default direct sampling procedures can be used. The paved or concrete pads of storage areas or tanks must be decontaminated and soils sampled (using default procedures) at areas of cracks, gaps or other damaged areas. Soil sampling at the edge of the pad is also required. Sample results are evaluated using the directed strategy (that is, all strata must be below closure levels) unless there is evidence of a release.

Sampling may not be required for storage areas or tanks in secondary containment. Default procedure sampling is only required if cracks, gaps, or damaged areas of the containment system existed. The secondary containment requires decontamination.

For closure of units other than aboveground tank systems, angled soil borings should be performed, with samples taken at the sides and below the bottom of the tank, and as close to the tank as possible. Additional borings should be located and oriented to allow sampling beneath the tank system. Soil below the bottom of the tank must be sampled in accordance with the procedures in Section 3.4.3.1 and Section 3.4.3.2 of the RISC Technical Guide. However, if the tank is removed, soil verification samples only are required unless contamination is detected above closure levels.

Closure of waste piles and surface impoundments require the complete removal of waste, liners, leachate, and materials contaminated with waste or leachate. Soil sampling should be conducted on a random

grid based on the assumption that the waste was homogeneous and evenly distributed. If the waste was not homogenous, directed default procedures can be used. These units also require Subpart F ground water monitoring, which is discussed in Section 2.10 of this User's Guide.

2.9.4 Sampling to Determine the Nature and Extent of Contamination

If soil screening results indicate that PECs exceed closure levels, a SAP to determine the complete nature and extent of soil contamination is required. The owner or operator should contact IDEM prior to submittal of such a SAP. Not only must the contamination boundaries (vertical and horizontal extent) be determined, a concentration gradient across the contaminated zone (the nature) must also be determined. This gradient will allow a more detailed estimate of risk. (An accurate estimate of risk cannot be made unless it is known how much contamination is present and the location of the contamination.) Chapter 4 of the RISC Technical Guide describes nature and extent determination requirements.

Once the nature and extent of contamination have been determined, a second set of PECs is calculated based on the nature and extent determination results. These PEC values are compared with closure levels. If the PECs are below closure levels, the unit is eligible for closure. Otherwise, options include either a non-default risk assessment or soil remediation. If a risk assessment is not feasible or remediation is not practicable (waste removal and decontamination to an appropriate standard), the unit must be closed in-place.

2.9.5 Closure or Verification Sampling

The RISC Technical Guide requires closure or verification sampling of surface and subsurface soils to demonstrate that contaminant concentrations are below closure levels for each impacted medium. Chapter 6 of the RISC Technical Guide describes the minimum number of samples, sampling locations, and decision criteria for closure sampling.

2.9.6 Industrial Closure Soil Sampling

For industrial closures, it is assumed that the soil or ground water contaminant concentrations exceed residential closure levels. Unless

the unit was closed through screening as provided in Chapter 3 of the RISC Technical Manual, the nature and extent of contamination in soil must be determined for all units using industrial closure levels because it is necessary to define the extent of the soil contamination that might impact ground water above residential values. For facilities with multiple sources, the procedures in RISC Technical Guidance, Section 4.1, page 4-1 may be followed. Ground water must be below default residential values at the boundary of property control.

2.10 RCRA Ground Water Sampling

As stated in Subpart G of 40 CFR 264 and 265, closure is required at all contiguous areas of land on or in which hazardous waste is placed or the largest area in which there is significant likelihood of mixing hazardous waste constituents in the same area. Subpart G of the regulations requires the consideration of ground water when determining clean closure standards (see 53 FR 8705). Therefore, the owner or operator must demonstrate either that there is no evidence of release of hazardous constituents to ground water or that ground water does not pose potential harm to human health or the environment as a result of facility-related contamination. Ground water sampling refers to the sampling needed to determine the extent of decontamination necessary to satisfy closure performance standards.

Ground water protection is a major concern in regulatory strategy for hazardous waste land disposal. Therefore, in addition to ground water sampling to meet closure levels, ground water monitoring is required at surface impoundments, waste piles, and land treatment units or landfills (hereafter referred to as "Subpart F units") that received hazardous wastes after July 26, 1982. Subpart F units must comply with Subpart F requirements for detecting, characterizing, and responding to releases to the uppermost aquifer and any hydraulically interconnected underlying aquifers.

This section clarifies the application of RISC Technical Guide procedures to the RCRA program and presents a discussion of how the procedures either comply with RCRA federal rules, or may necessarily be more stringent than RISC Technical Guide procedures. Within this chapter, ground water monitoring refers to the collection of samples required by Subpart F of 40 CFR 264 and 265.

Ground water is dynamic and can have temporal and spatial contaminant changes. The possibility of missing a plume of ground

water contamination is very likely if the site-specific hydrogeology is unknown. In addition, without significant sampling control, sampling techniques may not ensure the collection of samples representative of ground water within the media. Therefore, valid conclusions based solely on ground water data require strict sample collection control at pre-determined points in time and space based on knowledge of the characteristics of the ground water flow, and capability of obtaining representative samples.

This section discusses the following:

- SAP requirements
- Ground water screening
- Characterization of the nature and extent of contamination
- Ground water closure sampling
- Ground water monitoring

Where applicable, the discussion for each of these topics first addresses Subpart F unit requirements, followed by non-Subpart F unit guidelines.

2.10.1 Sampling and Analysis Plan Requirements

2.10.1.1 Subpart F Unit Requirements

Hazardous constituents under the RCRA program for ground water monitoring include those listed in 40 CFR 264, Appendix IX. The list of hazardous constituents to be analyzed for is based (1) on their presence in ground water (40 CFR 270.14 [c][4][ii]) and (2) their capability for harming human health or the environment (40 CFR 264.93 [b]). A hazardous constituent can be removed from the list of constituents to be analyzed if it can be demonstrated that the constituent is not present in ground water or is not present at concentrations that can pose a substantial present or potential future hazard to human health or the environment. This can be simply demonstrated by determining the total list of constituents in ground water samples. Otherwise, a hazardous constituent can be removed from the list of contaminants of concern if it is demonstrated that the constituent is not capable of posing a substantial present or potential

future hazard to human health or the environment (see 40 CFR 264.93 [b]).

2.10.1.2 Non-Subpart F Unit Requirements

Units not subject to Subpart F monitoring requirements must be sampled and analyzed using consistent procedures as described in Section 3.4.5 and Section 4.4.2 of the RISC Technical Guide. DQOs must be achieved.

Parameters for ground water analysis should include elements or compounds of the hazardous waste, hazardous constituents (as defined in 40 CFR 261, Appendix VIII), or hazardous waste constituents (as defined in 40 CFR 260.10). Parameters can be proposed by the owner or operator or IDEM. For Corrective Action purposes, the initial parameter list is comprised of any hazardous waste or hazardous constituent used at the facility, as well as any breakdown product or by-product of a hazardous waste or hazardous constituent used at the facility. With sufficient justification, parameters can be eliminated from the list during SAP preparation. Parameters can also be eliminated depending on sampling results. Parameters should be selected based on knowledge of wastes managed at each unit and may include other potential elements or compounds related to facility operations (such as breakdown products). This strategy is similar to U.S. EPA considerations for waste de-listing.

2.10.2 Ground Water Screening

2.10.2.1 Subpart F Unit Requirements

Screening under the RCRA ground water monitoring program is based on determining if a release has occurred from a unit to the uppermost aquifer at the compliance point. Subpart F units that meet the requirements of the indicator monitoring program of 40 CFR 265 and of the detection monitoring program of 40 CFR 264 satisfy the objectives of the screening process discussed in Chapter 3 of the RISC Technical Guide. The nature and extent of ground water contamination does not have to be characterized to satisfy the requirements discussed in Chapter 4 of the RISC Technical Guide if both of the situations below apply.

1. An adequate monitoring program at the unit has not yielded results that indicate a statistically significant indication of release during the unit's operation (including closure period).

2. Soil screening results indicate that hazardous constituents have not migrated from the unit to the uppermost aquifer.

If ground water monitoring results indicate detection of the presence of hazardous constituents from a Subpart F unit, an appropriate ground water monitoring program (that is, ground water quality assessment under 40 CFR 265 or compliance monitoring under 40 CFR 264) must be implemented at the compliance point. Detection is defined by statistically significant evidence that contamination exists, determined by comparing data collected at the compliance point(s) to the background water quality data.

Subpart F requirements do not apply after closure if all waste, waste residues, contaminated containment system components, and contaminated subsoil including ground water are removed or decontaminated to land use appropriate levels at closure. Chapter 6 of the RISC Technical Guide presents a methodology for demonstrating that a unit meets the closure performance standards and presents no potential harm to human health or the environment.

The groundwater sampling requirements for closure by removal and in-place closure are discussed further in the following sections.

2.10.2.2 Non-Subpart F Unit Requirements

Ground water screening at units not subject to Subpart F can consist of the method for screening presented in Section 3.4.5 of the RISC Technical Guide. In accordance with the strategy for ground water monitoring, as evidence increases that a release has occurred, additional sampling and analysis of ground water is needed to demonstrate that closure performance standards are not exceeded. Examples of situations that may require additional sampling of ground water include the following:

1. Detection of a hazardous constituent during ground water screening
2. Detection of a VOC hazardous constituent at concentrations exceeding the residential level in a preferential pathway to ground water
3. Detection of a VOC hazardous constituent at a concentration exceeding the residential level within the first sedimentary layer of similar texture and material above the saturated zone in soil screening
4. Subsurface soil sampling results indicate the presence of a non-VOC hazardous constituent at a concentration exceeding the residential level and the constituent is detected within the first sedimentary layer of similar texture and material above the saturated zone
5. Subsurface soil sampling results indicate the presence of a non-VOC hazardous constituent at a concentration exceeding the residential level and the constituent is detected in saturated soil.

If ground water samples are collected, it may be beneficial to also collect saturated soil samples in order to describe the saturated soil as was done for other soil samples.

If no constituent levels exceed closure levels, no other aspects of the nature and extent determination described in Chapter 4 of the RISC Technical Guide are necessary. If the closure performance standard for ground water is exceeded, characterization of the nature and extent of contamination (see Section 2.10.3 below) is necessary to determine the extent of remediation necessary (40 CFR 264.112 [b][4]).

2.10.3 Characterization of the Nature and Extent of Contamination

2.10.3.1 Subpart F Unit Requirements

To meet the requirements of a ground water quality assessment under 40 CFR, Part 265, or compliance monitoring under 40 CFR, Parts 264 and 270.14(c)(3) and (4), ground water monitoring must continue at least until the compliance period is completed (see 40 CFR 264.92). The compliance period is the number of years equal to the active life of the waste management area, including any waste management activities conducted prior to permitting and closure.

An adequate ground water quality assessment plan or compliance monitoring program should satisfy the objectives of the nature and extent determination outside the compliance point as discussed in Chapter 4 of the RISC Technical Guide. However, to satisfy closure performance standards, it may be necessary to determine the nature and extent of contamination for the plume within the compliance point.

If the assessment of the quality of the ground water shows that the unit has released hazardous constituents to the uppermost aquifer, post-closure care is required unless there is an adequate closure by removal.

If the owner or operator can demonstrate that a source other than a regulated unit caused the release to the ground water or if the detection was an artifact caused by an error in sampling, analysis, statistical evaluation or natural variation in the ground water, they are released from the requirements of ground water quality assessment under 40 CFR 265 or compliance monitoring under 40 CFR 264.

Characterizing the contamination also requires knowledge of the hydrogeology of the area. The uppermost aquifer unit and any hydraulically interconnected underlying aquifers (that is, all likely subsurface flow paths for hazardous constituents that could be released from the unit) should be identified. The hydrogeologic properties (for example, hydraulic gradient, ground water flow, rate, and direction), beneath the facility should be known and the supporting data used to identify this information (such as hydrogeologic investigation reports for the facility area) should be provided in the SAP. This information should be included in a report written by a qualified hydrogeologist on the hydrogeologic characteristics of the facility property supported by drilling logs for on-site borings and wells and available professional literature. A description of the regional geologic and hydrogeologic setting should also be included in the report. Guidance for establishing an adequate hydrogeology study is presented in U.S. EPA's 1986 "RCRA Ground-Water Monitoring Technical Enforcement Guidance

Document" (OSWER Directive No. 9950.1) or 1992 "RCRA Ground-Water Monitoring: Draft Technical Guidance Document" (EPA/530-R-93-001).

2.10.3.2 Non-Subpart F Unit Requirements

For units not subject to Subpart F requirements, the guidance in Chapter 4 of the RISC Technical Guide can be used to determine the extent of remediation necessary to meet the closure performance standards. One sampling event may not be adequate to define the characteristics of the nature and extent of contamination. Many times the investigation should proceed in phases, until the three-dimensional limit of the contaminant plume is defined. The final phase consists of conducting a controlled sampling program to determine the concentrations and movement of the contaminants within the plume. If the nature and extent procedure has shown that the unit released a listed hazardous waste into the ground water, the boundary between waste and contaminated media must be determined. ***Groundwater containing one or more hazardous constituents may not constitute a "waste", but may be considered a contaminated medium.*** The owner or operator may submit a justification of the distinction between hazardous waste and contaminated media. For closure by removal or decontamination, the hazardous waste must be removed and affected media must meet the land-use specific closure performance standard.

2.10.4 Ground Water Closure Sampling

2.10.4.1 Subpart F Unit Requirements

This section clarifies the procedures necessary to ensure that closure activities are in compliance with RCRA Subpart F requirements and satisfy closure performance standards. If hazardous constituents are not detected in the uppermost aquifer at the compliance point for a Subpart F unit, a detection monitoring program in accordance with 40 CFR 264.98 must be established to demonstrate that applicable closure standards have been met. If hazardous constituents are detected from a Subpart F unit at the compliance point during ground water monitoring, a compliance monitoring program must be implemented. Under the RCRA ground water monitoring program, the point of initial discovery is the compliance point. The ground water protection standard for Subpart F units must be met at the compliance point until completion of the compliance period as described in 40 CFR 264.95.

Upon demonstration of closure by removal or decontamination, a closure certification must be submitted to verify that the approved closure plan has been followed and to document that the Subpart F unit is compliant with the requirements of Subpart F. Subpart F requirements no longer apply after IDEM accepts the closure certification.

Within the compliance point, it must be demonstrated that there has not been a release to ground water beneath the waste management boundary. When a release has occurred or there is a potential release that exceeds the residential ground water level, additional ground water sampling is required as described below for units not subject to Subpart F requirements. Any deviations from the SAP resulting from problems encountered in obtaining representative ground water samples or from knowledge of the area should be adequately justified and discussed with IDEM.

2.10.4.2 Non-Subpart F Unit Requirements

For hazardous waste management units, SWMUs, and AOCs not subject to 40 CFR 264.91 through 264.100, it may have to be demonstrated that ground water beneath the units does not have a plume containing hazardous wastes or hazardous constituents, or that the plume will not present potential harm to human health or the environment. Obviously, if all hazardous waste is contained in a material that is removed, the closure performance standard has been achieved. However, if contaminated media are left in place exceeding land use specific closure levels**,** the potential for ground water degradation from soil leaching, or present ground water migration must also be determined.

When a hazardous waste or hazardous constituent from the unit is detected in ground water, the closure performance standard can be achieved by demonstrating maximum concentrations within the plume are below land use specific levels, and below residential levels at the point of property control. In addition, the owner or operator must demonstrate that the closure has controlled or minimized to the extent necessary to protect human health and the environment, post-closure escape of hazardous constituents or hazardous waste decomposition products to the groundwater.

Where there are multiple potential sources of particular hazardous wastes or hazardous constituents, or for large sites, the overall control

of the groundwater plume may be consolidated into one monitoring program. The Office of Land Quality has a non-rule policy document that addressed the issue of multiple sources (WASTE-0015-NPD).

Maximum concentrations detected when determining the nature and extent of the plume in ground water may determine the length of time needed to demonstrate closure. In order to demonstrate that concentrations within the plume do not exceed land-use specific closure levels throughout the plume and residential levels at the point of property control, a sampling program must be established to allow data evaluation once remediation has taken place. This sampling program is described in Chapter 6 of the RISC Technical Guide. The owner or operator may demonstrate that the closure activities have adequately controlled or minimized the plume by utilizing the Mann-Kendall trend test. Additional sampling may be necessary, if there is a statistically significant increase during the monitoring program.

If the statistical evaluation indicates that the land-use specific closure performance standard is achieved, the unit is eligible for closure by removal. If statistical evaluation indicates closure performance standards are exceeded, post-closure care (that is, post-closure permitting or corrective action) is required.

2.10.5 Contaminated Ground Water In-Place

When land-use specific levels are exceeded, additional sampling may be needed to demonstrate that the plume is controlled or minimized to the extent necessary to protect human health or the environment from hazardous constituents, or hazardous waste, or their decomposition products to the groundwater that may escape after closure. To satisfy the closure standard, it must be shown that the residential levels at the point of property control will not be exceeded and the land-use specific levels will not be exceeded beyond the perimeter of compliance. This can be demonstrated by plume stability as described in Appendix 3 of the RISC Technical Guide.

Chapter 3 Leaking Underground Storage Tank Program

Overview of Chapter 3

- Introduction
- Process for LUST Sites
- Initial Incident Reporting
- Site Prioritization and Reprioritization
- 20-Day Abatement and Free Product Removal Reporting
- LUST Site Investigation
- CAPs
- Land Treatment
- Quarterly Reporting
- Closure
- Supplemental Information
- ELTF Guidance

3.0 Introduction

In July 1993, the Office of Environmental Response, Underground Storage Tank (UST) Branch, published the Underground Storage Tank Branch Guidance Manual. This manual provided extensive guidance for regulated USTs, including guidance on initial notification, UST removal, release reporting, site characterization, corrective action, Excess Liability Trust Fund (ELTF) reimbursement, and closure. This was a major step in providing the regulated community with information about IDEM requirements for regulated USTs. In addition, The UST Branch started outreach seminars to help the regulated community and their consultants. In October 1994, a revised and improved version of the UST Branch Guidance Manual was published. This chapter replaces the LUST portion of the 1994 guidance manual. The following is a brief description of each section of Chapter 3.

Section 3.1 presents a brief overview of the steps involved in taking a LUST site from release notification to closure. The text contains numerous references to other chapters in the User's Guide, the RISC Technical Guide, and other sections within this chapter for more detailed information on specific topics.

Section 3.2 provides an update on initial incident reporting. Most of the information is similar to information in the October 1994 Underground Storage Tank Branch Guidance Manual. Clarification is provided with respect to different procedures for handling suspected and confirmed releases.

Section 3.3 discusses site prioritization and reprioritization. The site prioritization information has been updated to reflect RISC guidance. In the past, releases initially reported as low or medium priority later proved to be higher priority, but information regarding this change was not clearly communicated to IDEM. This section stresses the need for communication from the owner or operator regarding updating site prioritization.

Section 3.4 provides guidance on 20-day abatement and free product removal reporting. The 20-day abatement reports are only required for releases that pose acute or immediate hazards.

Section 3.5 provides LUST site investigation guidance, including departures from RISC guidance. These departures include automotive waste oil chemicals of concern (COCs), petroleum subsurface soil

characterization procedures for in-place USTs, and laboratory data submission requirements. The laboratory data submission requirements are a replacement for quality assurance project plans (QAPP) for sites that use default characterization and closure procedures.

Section 3.6 covers corrective action plans (CAPs), including a general discussion of evaluation criteria for different remedial options and public notification for LUST sites. Public notification requirements have not changed since publication of the October 1994 guidance.

Section 3.7 provides guidance on land treatment of petroleum-impacted soil. For land treatment requests, additional information on potential impact on ecological receptors is now required. In addition, analytical requirements now reflect the change from total petroleum hydrocarbons (TPHs) to COCs.

Section 3.8 provides site-specific criteria that trigger quarterly reporting. The criteria are presented in more detail than in the 1994 UST Section Guidance Manual. Also, note that the quarterly reporting time frames have changed.

Section 3.9 provides information on LUST-specific closure issues. The No Further Action (NFA) letter continues to be used to document closure.

Section 3.10 provides web links to various sites for supplemental LUST information. Included is a link to IDEM's UST Section guidance, which has been updated to reference current UST rules. Elements of RISC, such as petroleum COCs, will be considered for UST rules and guidance at a later date. UST guidance can also be obtained by contacting the UST Section at (317) 308-3064. LUST guidance can be obtained by contacting the LUST Section at (317) 232-8900.

Section 3.11 presents updated ELTF guidance. Guidance at this time does not include an application. An electronic version should be available on the web some time in the future. Section 3.11 does, however, explain how RISC policies will impact reimbursement.

Process for LUST Sites

- Release Reporting
- Site Characterization
- Soil Characterization
- Ground Water Characterization
- Closure

3.1 Process for LUST Sites

In the past, the LUST Section had only overseen releases from regulated USTs. The Section's responsibilities have been expanded to include releases from unregulated USTs that have not stored product since January 1, 1974. Unregulated UST sites must be closed following the same guidance used to close regulated UST sites with

regard to reporting, investigation, and closure. Common unregulated USTs include heating oil USTs for on-site use. Questions about regulated and unregulated USTs should be directed to the UST Section. A brief outline of the closure process for LUST sites is provided below.

3.1.1 Release Reporting

Initial incident reporting is the first step in the process and is discussed in Section 3.2. Most important is an accurate prioritization of the site. Acute hazards and conditions are key concerns that should be focused on when sites are evaluated. The user should have a thorough understanding of how these concerns affect site characterization. Section 2.3 in the RISC Technical Guide (Identifying Acute Hazards) discusses these concerns. Additional information is presented in several chapters of the RISC Technical Guide, including Chapter 2 (Presampling Activities), Chapter 7 (Nondefault), and Chapter 5 (Susceptible Areas). Information requested in the presampling chapter is a starting point for developing the conceptual site model (CSM). The nondefault and susceptible area chapters give guidance on nondefault procedures.

If an acute or immediate hazard is detected at the site, immediate response is triggered to mitigate the hazard, and submittal of a 20-day abatement report (see Appendix 3.2 of the User's Guide) is required. Section 3.3 provides more information on acute and immediate hazards. Only sites having acute hazards require the submission of a 20-day abatement report. If free product is encountered, a free product removal report (see Appendix 3.2 of the User's Guide) must be submitted within 45 days of discovery. Section 3.4 provides more information on the 20-day abatement and free product removal reports.

3.1.2 Site Characterization

The next step in the RISC process is site characterization. The goal of site characterization is to define the extent of contamination and evaluate potential receptors. An initial site investigation report, which is due following the format outlined in Appendix 1.1 of the User's Guide must be submitted to the LUST Section within 45 days from the date of the release. Information in the report is the basis for the CSM. LUST-specific guidance on site characterization is included in Section 3.5 of this User's Guide.

3.1.3 Soil Characterization

How soil characterization is performed depends on several factors. When the USTs are in place, the user should follow the guidance in

Section 3.5.4, but if the USTs have been removed, the user should follow the guidance in Appendix 4 (Petroleum Guidance) of the User's Guide. When either the UST vault or source area exceeds 0.5 acre, the nondefault, large source-size characterization in Chapter 7 of the RISC Technical Guide is applicable. The user should be aware that if the site must move into nondefault status based on a limiting condition (such as bedrock or ecological impact conditions), the investigation may proceed differently than it would under default closure status.

Releases around pump islands and lines should be characterized following the same guidance as for LUSTs. Generally, four soil borings should be sampled around the suspected release area and continue outward until sampling results do not exceed resident closure levels. Source removal rather than characterization is an option, but approval will be made on a site-by-site basis.

Soil characterization results will be used to determine potential exposure concentrations (PECs). If the PECs are less than default closure levels, no further action is required for soil. If a PEC exceeds a default closure level, a CAP is required for site closure (see Section 3.9). The user should be aware that samples from the smear zone are not used in determining the PEC, (see the environmental media definitions in Section 3.3.1 of the RISC Technical Guide). Section 3.5.4 provides a more detailed discussion of subsurface characterization and PECs.

Upon completion of the soil characterization process, the site should be re-evaluated to determine if it needs reprioritization.

3.1.4 Ground Water Characterization

Ground water screening should be conducted at the same time as soil characterization to determine whether ground water has been impacted. An exception is when ground water is known to be contaminated prior to soil characterization. This may be the case at sites where past site work has been conducted. In either situation, once a determination has been made that the ground water has been impacted, the extent of the ground water contamination must be determined.

A ground water screening waiver can be granted by the LUST Section if the release has had minimal impact on soil (see Section 3.5.2). If ground water contamination is detected at concentrations exceeding the estimated quantitation limits (EQLs), a nature and extent determination is required. Ground water sampling from the source area outward may be useful for determining locations for plume stability wells and to evaluate the presence of free product in the

source area. After the nature and extent determination, the site should be re-evaluated to determine if nondefault conditions exist or if the site needs reprioritization.

Ground water samples obtained through push probe sampling are acceptable for screening and nature and extent determination. Once the extent of ground water contamination is defined, the user should evaluate the concentrations with respect to land use and control of the properties affected. If concentrations are at or below residentia closure levels, the user can proceed straight to closure as discussed in Chapter 6 of the RISC Technical Guide. If the concentrations are at or below industrial closure levels for an industrial use property and property control has been demonstrated, the user can proceed straigh to permanent closure. However, an environmental notice for land and ground water use must be provided (see Appendix 5 of the RISC Technical Guide).

3.1.5 Closure

Most options for nondefault closure require the submittal of a CAP. If closure with institutional controls is selected, the institutional control should be in place prior to CAP approval (see Appendix 5 of the RISC Technical Guide). IDEM will review CAPs that do not include proo of institutional controls and will provide a remedy approval letter that approves the closure with institutional controls approach. CAP approval will follow once proof is provided that institutional control has been obtained. For this reason, once it is evident that a ground water plume is present off site, the process of obtaining an institutional control should begin so that CAP approval is not delayed.

Several options are available for soil closure, including the following:

- Using the 0.25-acre source size closure levels
- Remediating to default closure levels
- Using site-specific data in default equations to calculate nondefault closure levels
- Eliminating an exposure pathway, such as the direct soi pathway
- Performing other nondefault assessments as described in Chapter 7 of the Technical Guide

- Remediating soil to 100 parts per million (ppm) TPH concentration, (or higher), will be considered as a nondefault approach. Note: this does not apply to sites closing using 1994 guidance.

Chapter 7 in the RISC Technical Guide discuss nondefault closure options in detail.

If the site is not eligible to proceed straight to closure of ground water, the user can either remediate to closure levels, initiate closure with institutional controls, or perform a nondefault assessment. Some key issues in evaluating ground water closure options are property control, potential for the plume to be expanding, and levels of contamination. A plume stability demonstration cannot proceed until the free product at the site has been removed to the maximum extent practical. It ma be practical to treat commingled plumes as one plume regardless o whether the plumes originated from different facilities.

If remediation is chosen, once the remedial goals have been reached, the site can proceed to closure as discussed in Chapter 6 of the RISC Technical Guide. Closure goals can be cleanup to residential or industrial levels, or shrinking the plume to the area of property control and then initiating closure with institutional controls. Other nondefault options may be considered. However, they require a higher level of supportive data to assure they are protective of human health and the environment.

If demonstrating plume stability is an option, the site can proceed to stability monitoring as explained in Chapter 6 and Appendix 3 of the RISC Technical Guide. If the site undergoes eight quarters of stability monitoring and demonstrates a stable or shrinking plume, it can proceed to closure by monitoring for the next 5 years. For petroleum-contaminated sites, closure can be achieved with attenuation modeling in as little as 1 additional year after the initial eight quarters of stability monitoring are completed. If closure cannot be achieved through the attenuation modeling option, the site can still close if 7 years o quarterly monitoring (2 years initial plus another 5 years) show no increase in contaminant plume size or concentration. Other options are available for nondefault closure, in addition to the default options discussed above. Again, nondefault closure options may require a higher level of supportive data to substantiate the proposed nondefault closure.

Quarterly reports should be submitted for sites that (1) have acute conditions (LUST high-priority sites), (2) are undergoing active remediation (including landfarming), or (3) are performing quarterly monitoring for ground water closure. More information on quarterly

reports is presented in Section 3.7 (Land Treatment) and Section 3.8 (Quarterly Reporting) of the User's Guide.

3.2 Initial Incident Reporting

There are three basic release situations: emergency conditions, confirmed releases, and suspected releases. Incident reporting to IDEM is required for all confirmed and suspected releases. A copy o the incident report facsimile form is provided in Appendix 3.1. Copies of this document and others can also be obtained at the following LUST Internet link:

http://www.state.in/us/idem/olq/programs/lust/index.html

3.2.1 Emergency Conditions

If emergency conditions exist (inhabitable building affected, drinking water affected, utility conduits affected, or free product present), initial reporting must be made within 2 hours in accordance with 327 IAC 2-6.1. The report must be filed by calling (888) 233-7745 (in-state 24-hour emergency response telephone number) or (317) 233-7745 (for out-of-state reporting). Acute hazard mitigation is reimbursable by the ELTF.

3.2.2 Confirmed Releases

A confirmed release must be reported to IDEM within 24 hours by either:

- Calling (317) 232-8900 or, for in-state, 1-800-451-6027 (extension 232-8900) or
- Sending a facsimile to either (317) 234-0428 (primary number) or (317) 234-3403 (secondary number)

Reportable minimum analytical requirements for LUSTs are the detection limits presented inTable 4.1-1 in Appendix 4.1 of this User's Guide. However, when obvious visual or olfactory signs o contamination are present release notification should not be delayed by waiting for laboratory confirmation.

Confirmed release reports should include information specified in Parts A and B of the release reporting information provided in Section 3.2.4, below.

3.2.3 Suspected Releases

Suspected releases are recognized by the following:

- Erratic behavior of product-dispensing equipment
- Sudden loss of product through inventory control checks
- Tank tightness test failure (Two consecutive failed tank tightness tests is considered a confirmed release.)
- Water present in UST
- Free product present
- Vapors in basements, buildings, or nearby utility conduits

Suspected release reports should include the information discussed below under Section 3.2.4, Release Reporting, Part A. Owners and operators of UST systems in question must report a suspected release to IDEM within 24 hours by telephone or fax at the numbers given in Section 3.2.2. Owners and operators have 7 days to either negate or confirm suspected release reports by either facsimile or mail to the following address:

Indiana Department of Environmental Management
Leaking UST Section
100 North Senate Avenue
P.O. Box 7015
Indianapolis, IN 46207-7015

If IDEM does not receive written documentation within 7 days from the suspected release report date, an incident number will be assigned.

3.2.4 Release Reporting

Reporting information requirements for suspected and confirmed releases are summarized below.

Part A (Both suspected and confirmed releases)

1. Site name, address, contact person and telephone number, and UST facility identification number
2. UST system size and products contained
3. Owner or operator name, address, and telephone number

4. Reason(s) for suspecting a release
5. Future investigative steps

Part B (Confirmed releases)

6. Location of release (piping lines, dispensing island, USTs, joint connections, etc.)
7. Knowledge of release (failed tank tightness test, analytical results, catastrophic spill, etc.)
8. Affected area(s) (backfill, natural soil, ground water, utility lines, basements, etc.)
9. Site-specific information (affected utility conduits, drinking water intakes, or detection of free product)

Upon receipt of an initial incident report, IDEM will assign an incident number. This number and the UST facility identification number should appear on all future correspondence to IDEM. Failure to include these numbers may delay document review.

3.3 Site Prioritization

After initial incident reporting, the LUST site is prioritized. Site prioritization is based on the most appropriate site information typically available during initial LUST reporting. However, if site conditions change, the site priority could also change.

High-priority LUST sites are defined as sites with actual or potential receptor impacts that threaten human health or the environment through one or more of the following:

- Inhabitable buildings with vapors
- Drinking water
- Utility conduits
- Ecologically susceptible area
- Free product present
- Ground water impact within a 1-year time of travel to a locally designated wellhead protection area or within 1,500 feet of a public water supply well

Staff will be assigned to all high-priority sites.

Medium-priority LUST sites are defined as sites where ground water has been impacted, but no imminent threat to human health or the environment exists. The potential for receptor impact will be evaluated for medium-priority sites, and LUST Section staff will be assigned to medium-priority sites as needed.

Low-priority LUST sites are limited to sites where soil is impacted but a ground water impact is not present or is unproven.

Factors used to rank sites within each priority category include the following:

- Type of petroleum product released
- Predominant soil type in the area
- Ground water flow direction and velocity

At times, site reprioritization may be necessary. For example, during tank removal, initial indications may show that only soil has been impacted. However, further investigation may indicate ground water impact as well. In this case, a site is reprioritized from low to medium priority. If a site requires higher prioritization, the owner or operator must notify IDEM within 24 hours of discovery.

3.4 20-Day Abatement and Free Product Removal Reporting

One or more of the following conditions at LUST sites warrant immediate corrective action or mitigation:

- Presence of free product[1]
- Presence of explosive vapors in utilities conduits or inhabitable buildings
- Contamination of a drinking water supply at levels that exceed residential default closure levels

[1] Free product removal must be maintained and reflected on the Corrective Action Progress Report Form, which is submitted at least quarterly. Free product is defined in 329 IAC 9-1-23 as a "regulated substance that is present as a nonaqueous phase liquid, for example, liquid not dissolved in water."

Any one of these conditions requires that the owner or operator submit a 20-day abatement report to IDEM (at the address given in Section 3.2.3) within 20 days from the date of incident knowledge (see Appendix 3.2 of this User's Guide).

If free product is detected during UST closure or characterization activities, a free product removal report (see Appendix 3.3 of this User's Guide) must be submitted within 45 days of the discovery of free product or at a time specified by IDEM.

3.5 LUST Site Investigation

A source area investigation must be conducted at all sites where soil or ground water contamination is suspected. One copy of the LUST site investigation report must be submitted to IDEM (at the address given is Section 3.2.3) within of 45 days of initial notification. Three additional copies are required for sites with an assigned IDEM project manager, (all high priority and some medium priority sites). The site investigation report must follow the format presented in Appendix 1.1 of the User's Guide. The information required in the report guidance is similar to the CSM discussed in the RISC Technical Guide. All requirements of 329 IAC 9-5-4, and 40 CFR Parts 280.62 through 280.65, must be met, in addition to the guidelines presented in this User's Guide and the RISC Technical Guide.

The goal of the site investigation is to define the nature and extent of soil and ground water contamination. Both media should be defined as contaminated if sampling results exceed residential closure levels horizontally and vertically. Even if ground water concentrations encountered during screening are less than default residential closure levels, the extent of ground water contamination must be determined in all directions.

LUST site investigation activities for petroleum and chemical USTs; default guidance; petroleum COCs; subsurface petroleum characterization for in-place USTs, product lines, and pump islands; QAPPs; and data submission requirements are discussed below.

3.5.1 Petroleum and Chemical USTs

Most USTs contain petroleum hydrocarbon products. Therefore, most of the guidance provided concerns the typical petroleum LUST site: COCs, subsurface soil characterization, and attenuation modeling for closure of petroleum hydrocarbon-contaminated ground water sites.

Petroleum LUST guidance is also applicable to releases from nonpetroleum USTs except that (1) ground water closure cannot be attained through use of attenuation modeling and (2) the data quality objective (DQO) process and QAPPs are applicable during site characterization and closure. Sites regulated under the Resource Conservation and Recovery Act (RCRA) must be closed following RCRA guidance. Section 3.5.4 and the RISC Technical Guide present more information on DQOs and QAPPs.

3.5.2 Nondefault Guidance

Most of the guidance presented in the RISC Technical Guide contains default procedures for area screening and characterization. Nondefault options are available for conducting site activities also. One example of a nondefault procedure is the characterization of a source area greater than 0.5 acre, such as a very large UST tank farm.

Although area screening for soil is an option, its use at UST sites is minimal. Most LUST release locations are usually known or can be determined through minimal characterization effort. The use of nondefault soil area screening or characterization methods may require the development of a QAPP. Additional information on QAPPs is presented in Chapter 6 of the RISC Technical Guide.

For typical LUST releases, the main media of concern are subsurface soil and ground water. Even though releases occur below surface soil, the direct exposure pathway still needs to be evaluated unless this pathway can be eliminated. This does not apply to surface spills, which are not regulated by the LUST Section but fall under the spill rule (327 IAC 2-6.1) and are reported to the Emergency Response Section.

When source removal is an option, the vertical extent of contamination must be removed to the land use specific closure level. The minimum number of samples and sampling locations will be determined based on evaluation of site investigation data.

The normal ground water screening may not be necessary in some circumstances. For example, if a line leak has been detected and repaired, and a minor amount of contaminated soil was removed to residential default closure levels (confirmed through laboratory analysis), decisions about screening the ground water may not be necessary. Decisions on these issues will be made on a site-by-site basis.

Ground water must be screened unless a request for a waiver is submitted and approved by IDEM. Factors to consider may include contact with ground water of soil contaminated above the EQLs, estimated product loss, soil type, and amount of contaminated soil removed. The waiver provides documentation that supports a decision not to screen ground water.

3.5.3 Petroleum COCs

The three classes of petroleum hydrocarbons for which standard COCs have been determined are gasoline, high-end liquid hydrocarbon fuels, and hydrocarbon oil. Appendix 4.1 of the User's Guide lists the COCs by the three classes.

A fourth class of petroleum hydrocarbon COCs, waste motor oil, has been established for USTs. Waste motor oil is composed of nonspecific petroleum hydrocarbons designated for disposal or recycling. The following guidance applies when a release has occurred from a waste motor oil UST and excavation is chosen as a remedial option. In other words, the user would follow current UST rules and analyze samples for TPHs using Method 418.1, "Methods for Chemical Analysis of Water and Wastes". If more than 100 ppm TPH is present, then analysis of the waste oil constituents will be necessary. The following change in analytical methods does not apply to sampling at UST closures but only to remedial action. If remedial action is necessary, the gas chromatography/flame ionization detector (GC/FID) using the California modification to Method 8015, (TPH-8015) can be used to determine if all petroleum-impacted soil has been removed. This does not apply to the modified closure option in the UST rules but only to sites with CAPs that propose this option to the LUST Section.

The soil cleanup level for waste motor oil is 100 ppm TPHs as determined by SW-846 8015. This analytical methodology allows for identification of the specific range of carbon numbers and thus the likely product types that the soil contamination resembles (such as gasoline, diesel, or motor oil). If the analysis identifies the contaminant as "motor oil" or hydrocarbon oil, the waste motor oil COC standard of 100 ppm TPHs is applicable. If analytical results indicate that the contamination resembles a different petroleum hydrocarbon (such as diesel), the high-end liquid hydrocarbon fuel COCs would be used. Similarly, for gasoline range hydrocarbons, the gasoline COCs should be used (see Appendix 4.1 of the User's Guide). The presence of a contaminant identified as gasoline or a high-end liquid hydrocarbon fuel will require ground water screening. If an oil-range hydrocarbon is identified, no ground water screening is required.

During excavation, soil should also be field screened for the presence of volatile organic compounds (VOCs) using a photoionization detector (PID) or a flame ionization detector (FID). PID results should demonstrate that the extent of VOCs in the soil has been defined and, thus, removed or that VOCs are absent, entirely.

Some petroleum hydrocarbon products do not have standardized COCs. Contaminants are determined on a site-by-site basis for these chemicals. These sites require a complete and detailed QAPP to identify the COCs. All parts of the QAPP must be completed, including DQOs, a health and safety plan, a sampling and analysis plan, and a data quality assessment. Additional information on QAPPs is presented in both the RISC Technical Guide and this User's Guide (see Section 3.5.5). Guidance on acceptable analytical methods for appropriate EQLs is provided in Appendix 2 of the RISC Technical Guide. OLQ's Chemistry Section may be contacted at (317) 232-3215 for information regarding analytical requirements for other chemicals. Contact the LUST Section for other approved analytical methods.

3.5.4 Subsurface Petroleum Characterization for In-Place USTs, Product Lines, and Pump Islands

As discussed in Appendix 4.2 of the User's Guide, subsurface petroleum characterization guidance requires a boring in the center of the suspected area of contamination. Although this guidance works for sites where USTs have been removed, drilling a soil boring inside the center of a UST vault is not reasonable when USTs are present. This guidance presents an alternative subsurface soil characterization method for use whenever USTs, product lines, or pump islands remain in place.

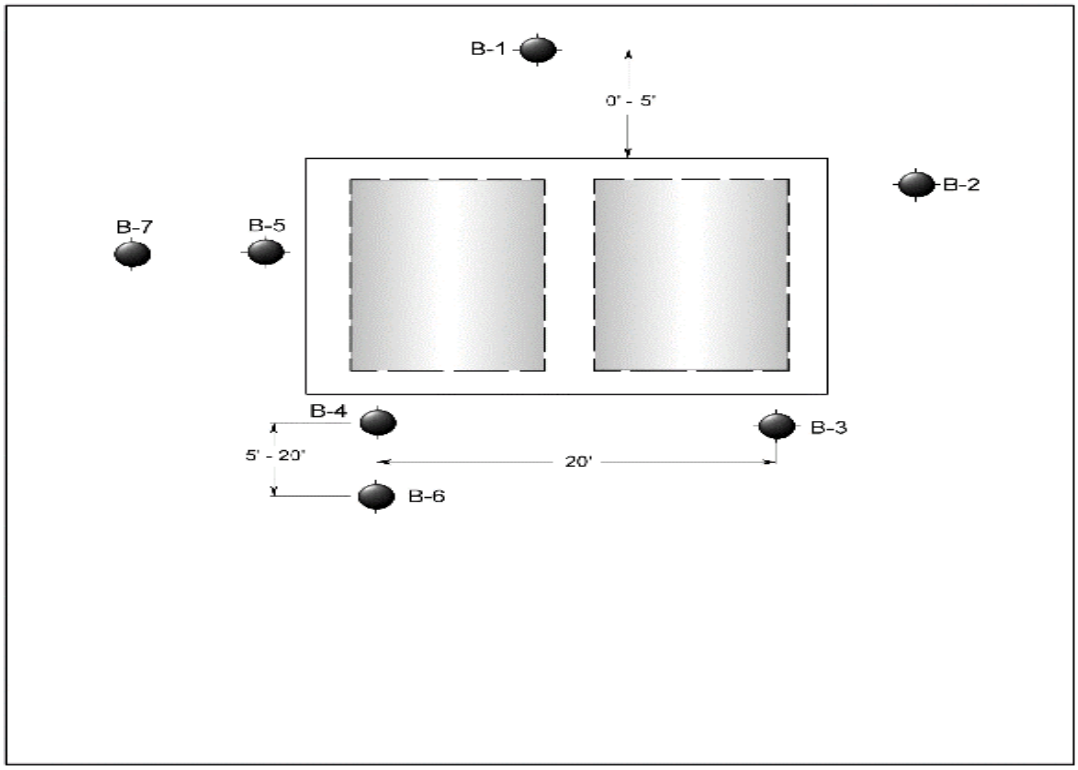
The investigation consists of drilling one soil boring for every 20 feet of circumference around the UST vault, with a minimum of four borings. For example, a UST vault with a 110-foot circumference would require five borings. An illustration of the sampling locations is shown in Figure 3-1. This method is consistent with guidelines for in-place closure. The borings should be drilled within 5 feet of an UST, pump island, or product lines. The goal of the investigation is to determine the extent of soil contamination at levels exceeding the residential default closure levels for COCs.

Additional soil borings should be drilled in four general directions (not necessarily along north-south or east-west transects) starting where it is suspected or known that the release occurred. The soil borings should be drilled at 5 to 20-foot intervals out from the release area.

The results of this assessment plan are two transects that cross at the release point and are used to calculate the size of the source area. Latitude on placement is permissible to allow for above ground and underground obstacles. Soil sample results from these borings and from other previously drilled borings are used to calculate the PEC. The PEC is then compared to the land-use default closure levels. If the PEC is less than the closure levels, no further action is required for soil.

The default characterization for pump islands and product lines is performed by drilling four borings around the release location, performing the stepouts (if needed), and calculating the PEC. Characterization for pump islands and product lines would be required only when relatively large releases have occurred and may not require the same amount of effort described above for USTs. Removal of contaminated soil without characterization is an economical option for relatively small sources (see Section 3.5.2). However, alternative nondefault characterization options can also be considered.

Figure 3-1: Illustration of Sampling Locations



The circumference of the UST vault is 110 feet. Because one boring should be drilled for every 20 feet of circumference, the number of borings required is five. If COC levels are greater than residential closure levels at B-5 and B-4, at least two additional borings are required (B-6 and B-7). This step-out method is repeated until the extent of contamination is defined. The source size area will be the square of the greater distance between B-6 to B-1 or B-7 to B-2. The PEC is calculated by averaging each COC and adding one standard deviation. For example, the following contaminants and concentrations were encountered in soil samples from borings B-1 through B-7: benzene (30, 3, 55, 234, 88, 3, and 15 parts per billion [ppb]); ethylbenzene (6, 3, 35, 102, 22, 3, and 3 ppb); toluene (60, 3, 80, 145, 48, 3, and 7 ppb); and xylenes (3, 3, 50, 85, 10, 3, and 3). It should be noted that nondetects should be represented by one-half of the EQL, which is approximately 3 ppb in this case. The resultant PECs would therefore be 143 ppb for benzene, 61 ppb for ethylbenzene, 102 ppb for toluene, and 55 ppb for xylenes. The site can close using commercial/industrial levels and institutional controls. However, it would fail residential default closure values because the benzene PEC of 143 ppb is greater than the residential risk-based level of 34 ppb.

Ground water sampling is performed at the initial round of soil borings and is not required if ground water contamination is already known or presumed to exist. In this case, the user would proceed straight to determining the extent of contamination. In this case, ground water samples would be collected from borings B-1 through B-5. Samples from other borings (B-6 and B-7) are optional.

Petroleum guidance also requires that a ground water sample be collected from the center boring. For in-place USTs, product lines, and pump islands, the center of the source area may not be readily accessible. In this case, ground water samples should be collected from all initial borings around the source area (see Figure 3-1).

3.5.5 QAPPs

A QAPP is a complete and detailed description of where, how, what type, and how many samples will be collected. It incorporates all the information needed to generate usable data. It provides a detailed description of all activities, quality specifications, and precautions associated with sample collection, handling, and analysis.

Because DQOs have been incorporated into much of the petroleum guidance, formal QAPP development is not necessary in many circumstances. QAPP development is appropriate in the situations below.

- Petroleum products which do not have standardized COCs. Therefore, the COCs must be developed.
- Nondefault screening and characterization methods are used.
- Nondefault closure sampling is performed.

Additional information on QAPPs is provided in Section 6 of the RISC Technical Guide.

3.5.6 Data Submission Requirements

Data quality assessment and quality assurance/quality control (QA/QC) requirements have not changed from previous LUST guidance. Persons other than environmental contractors or consultants who gather environmental samples should also follow specific laboratory requirements as applicable to ensure the validity of sample results. These requirements should cover sample acquisitions, containers, preservation, shipping requirements, holding times, storage, chain of custody, and decontamination of equipment between samples.

QA/QC information should be kept by the laboratory and provided to IDEM, if requested. Two samples (duplicates) should be collected, one for field screening and one for laboratory analysis. Samples used for field screening should not be sent to the laboratory for analysis.

Proper sampling and laboratory analysis are required to verify site conditions. Sampling and analysis methods must be consistent with guidance provided in U.S. Environmental Protection Agency (U.S. EPA) publication SW-846, "Test Methods for Evaluating Solid Wastes, Physical and Chemical Methods," Third Edition. QA/QC procedures outlined in the methods must be followed and the documentation should be available for submission to IDEM upon request.

Sample information that must be included is as follows:

- A QA/QC package containing a signed Laboratory Certificate of Analysis listing analytical methods, preparation methods, dates of sample receipt analysis; and a statement that the method QA/QC procedures were followed
- Chain of custody documentation, including laboratory receipts
- Decontamination procedures
- Sampling procedures and techniques

Any questions regarding sample handling and analysis should be directed to OLQ's Chemistry Section at (317) 232-3215.

Site investigation reports must be prepared following the guidance presented in Appendix 1.1 of this User's Guide. The only exceptions to the guidance are the development of the site-specific QAPP and the sampling and analysis plan.

3.6 Corrective Action Plans

There are two closure options for corrective action, closure without institutional controls and closure with institutional controls. Institutional controls are utilized to restrict access to media that contain contaminant concentrations in excess of residential exposure levels. Examples of institutional controls are restricting land use to industrial purposes or prohibiting the use of the ground water for potable purposes. Closure without institutional controls is applicable to sites where unrestricted exposure to soil and ground water are allowable.

Remedial options can differ for each medium. Thus, even if site characterization demonstrates that no further action is needed for closure without institutional controls for soil, closure with institutional controls may be desirable if the site has a stable ground water plume.

The CAP differs depending on which remedy option is selected and whether active remediation is used to achieve cleanup goals.. Sites that demonstrate compliance with closure levels during characterization can include CAP information in the site investigation report. Sites where remediation is conducted to attain closure must also demonstrate that the selected remedial technology will be effective.

The CAP summarizes information in the site investigation report for all options and should be submitted to the address given in Section 3.2.3.. Information should be current for items such as quarterly monitoring results, sampling results, and ground water flow maps. The CAP must discuss various available options and provide justification for the closure option selected. Since cost is a factor in approving the corrective action remedy, the justification should include a cost comparison of all closure options.

According to 329 IAC 9-5-8, some form of public notification is required for all confirmed releases that require a CAP. The regulation applies to the public directly affected by either the release or by the planned corrective action. The following six options are acceptable forms of public notification:

- Notice in local newspapers
- Block advertisements
- Public service announcements
- Publication in the Indiana Register
- Letters to individual households
- Personal contacts by field staff

All affected parties must be notified consistent with the criteria listed above. In addition, all notification activities must be documented in the CAP.

A CAP will not be considered for review by IDEM unless an adequate site investigation has been completed. Additional details on the format for the site investigation report are presented in Section 3.5 of this User's Guide. At least one copy of the CAP is required for each site. Additional copies may be requested for sites with an assigned IDEM project manager. The ELTF guidance in Section 3.11.4 provides the copy requirements for the CAP.

More information and more justification for proposed remedy options will be required for sites that are high priority or that impact an exposure pathway not considered by the default (such as surface water). These sites will also undergo a higher level of IDEM review.

3.6.1 Closure with Institutional Controls

Closure with institutional controls relies on institutional controls to prevent exposure to contaminated media. The institutional control is usually an environmental notice attached to the deed of the affected property. Prior to CAP approval, a true copy of the recorded environmental notice must be included in the CAP. For CAPs that do not include all necessary environmental notices the LUST Section will review the institutional control remedy and evaluate whether it is acceptable for closure at the site. If acceptable, IDEM will then approve the CAP after receiving proof that the environmental notices have been filed. Additional information on environmental notification and information to include in the notice is presented in the RISC Technical Guide, Appendix 6. The CAP must state that the closure with institutional controls option will be implemented.

When commercial/industrial closure levels are used, a CAP must be submitted with a true copy of the recorded environmental notice for land use. The CAP must state clearly which closure levels are used.

If closure with institutional controls is used for ground water, a plume stability demonstration must be submitted to IDEM. Closure of these sites requires that the plume be stable or decreasing. CAPs can be approved prior to demonstration of plume stability as long as environmental notices prohibiting exposure to the ground water are in place for all affected properties. If it is determined through plume stability tests that the plume is increasing, either remediation must be implemented or, if applicable, a nondefault assessment must be performed. If a plume fails a stability test, IDEM must be notified as soon as possible and an amended CAP must be prepared and submitted. More information on plume stability is presented in Appendix 3 of the RISC Technical Guide.

As indicated above, the information required for CAPs that propose closure with institutional controls depends on whether remediation is necessary to achieve closure goals. For closure with remediation, the CAP should contain all the elements described in the Remediation Work Plan outline presented in Appendix 1.2 of this User's Guide. For closure without remediation, the CAP need not contain discussions on treatability studies, pilot tests, and selected remediation technologies.

3.6.2 Closure without Institutional Controls

As discussed previously, there are two ways to achieve closure without institutional controls. Either the site characterization must demonstrate that contamination is below residential closure levels, or active remediation must reduce contamination to residential closure levels. For closure utilizing remediation, the CAP should contain all the elements described in the Remediation Work Plan outline in Appendix 1.2 of this User's Guide. For closure without remediation, the investigation report can serve as both the CAP and the closure report.

3.7 Land Treatment

Land treatment is a process in which petroleum-contaminated soil is spread on an impermeable barrier to allow contaminants to volatilize and biochemcially degrade. It is generally performed on the site where the release occurred. Under certain conditions, off-site treatment is allowed, but only if the owner of the LUST site is also the owner of the proposed off-site treatment property. In all cases, land treatment must be pre-approved by the LUST Section.

This process is cost-effective and decreases contaminant levels and treatment time. The type and level of contamination, as well as soil type, primarily determine the length of time required for remediation. Clay-rich soil binds up contaminants and requires longer remediation time. Short-chain hydrocarbons (such as gasolines) require less time to degrade than long-chain hydrocarbons (such as diesel). For this reason, soil contaminated by automotive waste oil will not be approved for land treatment. It is also important to note that in order for bioremediation to be fully beneficial, the treatment cell location must be available long enough to complete the remediation process.

Many factors can improve the rate of biodegradation. Adjustment of the most limiting factors can increase the rate of biodegradation and shorten remediation time. The most common land treatment option, biostimulation, increases the activity of the indigenous microbial population in the soil by aeration and adding nutrients. In addition, bacteria cultured for specific contaminants can be added (bioaugmentation). Bioaugmentation is useful when indigenous bacteria are not available to degrade organic chemicals, such as for a recent spill. Bacteria need enough time to mutate, acclimate, and increase their population in order to be effective in the degradation process. Some of these factors are briefly discussed in Table 3-1 on the following page. When known, general ranges for optimum bacteria activity are given.

Responsible parties and contractors need to evaluate land treatment options and consider their costs and benefits. An advanced remediation system can be created by conducting pilot studies to determine optimum site-specific conditions for biodegradation, however, the costs of pilot studies and treatment and monitoring may be prohibitive. An IDEM technical evaluation of bioremediation is available at the following Internet address:

http://www.state.in.us/idem/olq/publications/papers/index.html.

Call (317) 232-8900 and the LUST Section will send copies of the evaluation

The Office of Air Management may require air emission controls for land treatment. Emission facilities need to be pre-approved and registered if they potentially emit more than the following thresholds:

- 3 pounds of VOCs per hour
- 15 pounds of VOCs per day
- 25 tons of VOCs per year
- 10 tons per year of any one or 25 tons of any combination of the Hazardous Air Pollutants listed in Section 112b of the Clean Air Act.

Land treatment may not be allowed in regions identified as nonattainment areas by IDEM's Office of Air Management. That office can be contacted at (317) 233-5686 for further guidance. In addition, discharges of runoff and treated leachate may require a National Pollutant Discharge Elimination System (NPDES) permit from the Office of Water Management. For more information on NPDES permits, contact the Office of Water Management at (317) 232-8476.

Table 3-1. Biodegradation Factors

Factor	**Explanation**
Nutrients	Nutrients can be adjusted to make an ideal environment for bacteria to degrade organic contaminants. In order for nutrients to be beneficial, they need to be added in a usable form, at appropriate concentrations, and at proper ratios. Commercial fertilizers and farm manure can be used. Backfill or natural materials from 10 feet or more below the soil surface generally supply little, if any, needed nutrients (organic matter).
Macronutrients	These include nitrogen, phosphorus, potassium, calcium, magnesium, and sulfur. Of these six macronutrients, nitrogen and phosphorus have received the most research attention. Nitrogen and phosphorus are readily available, inexpensive, and easy to apply. Application rates and optimum ranges depend on the site. Nitrogen and phosphorus are usually limiting factors, and their addition should enhance bioactivity. The typical ratio for optimal nutrient addition for carbon-nitrogen-phosphorus is 100:10:1.
Moisture	Microorganisms become dormant at moisture extremes and become active when favorable conditions return. Moisture control is simple: provide drainage within the treatment cell during wet seasons, and add moisture during dry seasons. The optimum range for soil moisture is 20 to 80 percent.
Oxygen	Any movement of the soil expose contaminants to the air increases volatilization and biodegradation. Working soil in the treatment cell with a rototiller, disc, plow, or windrow equipment will increase oxygen availability. The optimum oxygen range in soil for bioactivity is 4 to 5 percent.
pH	When soil is too acidic or basic, nutrients become unavailable to the microorganisms because the nutrients bind to the soil particles or because the nutrient form is altered. The optimum pH for bioactivity is 7, and pH should be kept between 6 and 8.
Temperature	Biodegradation can occur between 20 EF and 90 EF. Activity is optimal at temperatures greater than 40 EF.

3.7.1 Land Treatment Plan

The land treatment plan must be submitted to the LUST Section for preapproval at the address given in Section 3.2.3. Plans must be concise, in narrative form, and include the following information:

1. An amended LUST site investigation map showing the treatment area
2. Treatment cell illustrations that include the following:
    a. Construction diagrams with dimensions
    b. Cross sections with dimensions
    c. All measurements and locations of treatment project design components (including soil depth, buffer zones, water collection, and other details)
3. Description of cell construction
4. Description of impermeable layer (at least 12 mils thick)
5. Description of berm construction (at least 6 inches above the upper soil surface layer level)
6. Water run-off and leachate collection system and associated sampling and disposal procedures
7. Local land use
8. Depth to ground water and type (perched or seasonal)
9. Proximity to ecologically susceptible areas.

The land treatment plan must also include the following treatment and activity information:

1. Initial contamination levels (field instruments can be used
2. Soil volume to be treated
3. Tilling schedule
4. The following, as applicable:
    a. Nutrient application rates
    b. Moisture adjustments
    c. pH adjustments
    d. Bacteria additions (type, application rate, and media)
    e. Pretreatment levels of these factors

Proper cell construction is necessary to protect the environment during the remediation process. The land treatment location should provide enough space for the soil to be spread in layers no more than 18 inches thick. It may be acceptable to design the treatment cell to accommodate several layers (lifts). However, the soil must still be treated and sampled in 18-inch-thick lifts. Room also must be allotted for berms, heavy equipment maneuvering, and contaminated water containment and treatment.

The seasonal high water table for the treatment location should be determined. A site that is dry in summer may pond with water for several months in the spring. The treatment cell must be kept out of drainage ways. Even small drainage ways can channel a large amount of unnecessary water into the treatment cell, requiring containment and treatment.

Adjacent land use must also be considered. For example, site access must be controlled, especially if the site is located in a populated area.

3.7.2 Off-Site Land Treatment

The off-site treatment of contaminated soil is allowed only when the owner of the LUST site is also the owner of the proposed treatment property. In addition to complying with the previously discussed land treatment guidance, the following requirements must be met for offsite treatment.

Off-Site Land Treatment Information

1. LUST site information must include the following:

    a. Owner or operator name
    b. Site name
    c. Site address
    d. Telephone number
    e. LUST incident and UST facility number

2. Off-site information must include the following:

    a. Copy of deed or title
    b. Legal description of property

Maps and Illustrations of the Off-Site Property

1. Illustrated legends and compass directions at an appropriate scale
2. A legible topographic base with 10-foot intervals
3. Location and depth of all private wells within a 1-mile radius of the site property
4. Surface water bodies within a 1-mile radius of the site property
5. Soil Conservation Service soil map and descriptions
6. Proximity to sensitive populations and environmentally susceptible areas (such as schools, woodlands, and wetlands)

Transportation

The guidelines below must be met during the transportation of the contaminated soil. In addition, IDEM requires that the information below concerning the logistics of the transportation also be provided.

1. The load must be covered by a tarpaulin to prevent rainwater infiltration, blowing of material, and other dispersion
2. Hauler information (bill of lading)
   a. Name of company
   b. Business address
   c. Telephone number
   d. Driver's name and commercial driver's license number
3. Total amount of soil to be transported (in tons or cubic yards)
4. Initial COC concentrations
5. Date and time of transportation

IDEM will respond in writing within 14 days of receipt of a written off-site treatment request. The letter will either approve or deny the request, or ask for additional information. Transportation cannot begin prior to receipt of written approval from IDEM. A copy of the approval letter must be maintained at both the LUST site and the off site treatment property. The treatment process can begin upon receipt of the approval letter.

If off-site land treatment is utilized for an UST over-excavation closure, the UST closure report must include the Corrective Action Progress Report (see Appendix 3.4), and the Remediation Progress Report (see Appendix 1.3).

The off-site treatment process must be maintained until soil contaminant concentrations are at or below residential closure levels. Use of nondefault closure levels may be possible. If treatment ceases prior to attaining closure levels or monitoring and reporting requirements are not met for any reason, the LUST Section will refer the site to IDEM's Office of Enforcement for enforcement action for illegally disposing of special waste.

Local fire and health departments should be notified regarding contaminated soil transportation and the proposed off-site land treatment. The use of off-site property for land treatment of petroleum-contaminated soil should not violate any local zoning laws or covenants, nor should it be inconsistent with any third-party agreements.

3.7.3 Land Treatment Field Sampling

IDEM's two main concerns regarding land treatment are that the contaminated soil has been remediated and that the treatment location has not been contaminated during the treatment process. Field sampling is intended to accomplish these goals. Field sampling plans for land treatment must include the following information:

- Schedule for field sampling events
- Location of site to be sampled
- Procedures for sampling
- Equipment to be used

Field instruments can be used to determine initial contaminant levels and for quarterly monitoring. While field instruments are not as accurate as laboratory analysis, they save time and money while providing an estimate of the level of contamination.

In order to allow comparison of quarterly monitoring results, it is best to use the same type of field screening instrument throughout the remediation process. Field instruments should always be calibrated before use. The number of field samples for monitoring purposes must be double the number required for final confirmatory sampling. Field samples should not be composited.

3.7.4 Land Treatment Progress Reporting

Corrective Action Progress Reports must be submitted quarterly throughout the remediation process. These reports must include sampling results and a summary of actions completed during the quarter. At the end of the project, a remediation completion report must be filed to document that that cleanup has been achieved.

- Brief narrative of the remediation process
- Data from the performance monitoring plan graphically displayed to show remediation effectiveness
- Other documentation to support conclusions

All reports must be signed by an experienced environmental professional (such as an engineer, geologist, hydrogeologist, or Certified Hazardous Materials Manager [CHMM]).

3.7.5 Land Treatment Confirmation Sampling

Soil samples must be collected and submitted to a laboratory for analysis to confirm that contaminated soil has been remediated. Sampling plans are necessary for confirmation sampling and must include the following information:

- Schedule for field sampling events
- Location of samples (field and confirmational)
- Sampling procedures to be used
- Laboratory methods
- Chain-of-custody procedures
- QA/QC procedures

The COCs for land treatment are the petroleum COCs presented in Appendix 4.1. Soil samples should not be composited and sampling patterns must be designed to reduce bias and provide complete site coverage. Random sampling procedures, such as grid patterns, are best suited for accomplishing these goals. Sampling locations should be in the bottom third of the contaminated soil layer. Table 3-2 below should be used to determine the necessary number of samples required.

Table 3-2. Land Treatment Confirmatory Soil Sampling

Cubic Yards of Soil Treated	No. of Treatment Cell Samples	No. of Underlying Samples
0 - 10	1	1
11 - 100	2	1
101 - 500	3	1
501 - 1000	4	2
Each additional 500	1	1

Once confirmation sampling indicates that COC levels are at or below land use-specific closure levels at all sampling locations, the soil can be considered remediated. If commercial/industrial closure levels are use, the soil must remain on site. For off-site land treatment, residential closure levels are required.

To establish that the treatment cell location has not been contaminated by the remediation process, soil underlying the impermeable layer must be sampled and analyzed. As with the confirmation sampling, the COCs for analysis are the petroleum COCs listed in Appendix 4.1.

3.8 Quarterly Reporting

Quarterly reporting tracks the remedial progress of sites through the final site report. A quarterly report must be submitted for the following situations:

- Acute hazards (presence of free product, vapor intrusion, or drinking water impact)
- Active remediation projects
- Quarterly ground water sampling for plume stability or petroleum attenuation

For soil, the following active remediation options require quarterly reporting:

- Land treatment
- Soil vapor extraction
- Air sparging
- Landfilling
- Bioremediation

For ground water, the following active remediation options require quarterly reporting:

- Pumping and treatment
- Monitored natural attenuation

The quarterly report should include both the information in the Remediation Progress Report form (see Appendix 1.3 of this User's Guide) and a completed Corrective Action Progress Report form (see Appendix 3.4 of this User's Guide). These reports should be submitted to the address given in Section 3.2.3. For sites closing with institutional controls, a RISC plume stability demonstration is required in addition to the reporting requirements discussed above.

The LUST Section has changed the quarterly report time frames. The following schedule for quarterly sampling and reporting should be used:

Quarter 1	January 1 - march 31	Report due April 30
Quarter 2	April 1 - June 30	Report due July 31
Quarter 3	July 1 - September 30	Report due October 31
Quarter 4	October 1 - December 31	Report due January 31

A new CAP Progress Report form is available for download at the LUST web site at:
http://www.state.in.us/idem/olq/programs/lust/index.html

3.9 Supplemental Information

Additional LUST guidance can be obtained by contacting the LUST Section at the following Internet links:

- Indiana Code (IC) 13-23-13, Corrective Actions:

  http://www.state.in.us/legislative/ic/code/title13/ar23/ch13.html

- 329 Indiana Administrative Code (IAC), Article 9, USTs:

  http://www.state.in.us/legislative/iac/title329.html

- LUST web site:

  http://www.state.in.us/idem/olq/programs/lust/index.html

- Indiana Department of Natural Resources Water Well Record Database:

  http://www.state.in.us/dnr/water/wellwater/index.html

- IDEM Special Waste Information:

  http://www.state.in.us/idem/olq/special_topics/special_waste/index.html

- IDEM UST Section Guidance:

  http://www.state.in.us/idem/olq/about_olq/programs.html#ust

- IDEM Geological Services Section, Technology Evaluation Documents:

  http://www.state.in.us/idem/olq/programs/geoserv/index.html

3.10 ELTF Guidance

The ELTF is administered by the Excess Liability Trust Fund (ELTF) Program and was created under IC 13-23-7 through 9 (previously IC 13-7-20) to provide the following:

- A method to reimburse eligible tank owners for LUST cleanup costs and any third-party liability costs

- A method to help tank owners fulfill federally required financial assurance requirements

- A method to guarantee loans for tank owners who wish to upgrade their present systems but are unable to obtain financing

UST owners who want to make claims to the ELTF need to be aware of eligibility requirements. These requirements have changed since the original statute was passed and are summarized below.

- All regulated USTs must have been registered with IDEM at the time of the discovery of the release. If unregistered tanks are present, a percentage-based reimbursement will be made depending on the number of tank fee payments that have been missed.

- All tank registration fees must be current. If tank fee payments have been missed, a percentage-based reimbursement will be made depending on the number of tank fee payments that have been missed. If less than 50 percent of the payments have been made, the claim will be deemed completely ineligible. The formula for reimbursement for owners and operators who have failed to pay tank fees due under IC 13-23-12-1 is available in 328 IAC 1-3-3(b).

- Any release from the UST system must be reported to IDEM and have an incident number assigned.

- A CAP for remediation of the site must have been approved in writing by IDEM or have been deemed approved in accordance with IC 13-23-8-4.

- The UST owner or operator must have been in compliance with all applicable federal and State laws and regulations governing USTs by the date the requirements became effective.

- The UST owner or operator has not defaulted on a loan with the loan guaranty program.

- The deductible specified in IC 13-23-8 has been paid.

Additional ELTF guidance is available in 328 IAC, UST Financial Assurance Board, at the following Internet address:

http://www.state.in.us/legislative/iac/title328.html

Additional information relating to activities involved with the site remediation process can be obtained by sending a letter to the address below or calling (317) 234-0990.

Leaking Underground Storage Tank Section
Indiana Department of Environmental Management
100 North Senate Avenue
P.O. Box 7015
Indianapolis, IN 46206-7015

Appendix 5 provides an ELF and RISC Fact Sheet (see Appendix 5.1) and an ELF/RISC Nonrule Policy Document (see Appendix 5.2). These documents provide more information on ELTF eligibility.

The following subsections discuss deductibles, examples of eligible expenses, examples of ineligible expenses, and instructions for application for ELTF eligibility. Application packages are available by calling (317) 234-0990.

3.10.1 Deductibles

The deductible for petroleum UST involved in an incident for which a claim is made is $35,000 if the conditions below apply.

- The UST is NOT in compliance with U.S. EPA regulations, rules adopted by the Solid Waste Management Board, and rules adopted by the Fire Prevention and Building Safety Commission concerning technical requirements relating to the

specifications for petroleum USTs before the date the tank is required to be in compliance.

- The UST is in compliance with the regulations and rules above on a date required in IC 13-23-8-4 at the time the release was discovered.

The deductible for a petroleum UST involved in an incident for which a claim is made is $30,000 if the conditions below both apply.

- The UST is in compliance with U.S. EPA regulations, rules adopted by the Solid Waste Management Board, and rules adopted by the fire prevention and building safety commission concerning technical requirements relating to the physical characteristics of petroleum USTs before the date the tank is required to be in compliance.

- The UST is not a double-walled, steel petroleum tank with double-walled, steel piping.

The deductible for a petroleum UST involved in an incident for which a claim is made is $25,000 if the conditions below both apply.

- The UST is in compliance with U.S. EPA regulations, rules adopted by the Solid Waste Management Board, and rules adopted by the Fire Prevention and Building Safety Commission concerning technical requirements relating to the specifications for petroleum USTs before the date the tank is required to be in compliance.

- The UST is a double-walled, steel petroleum tank with double-walled, steel piping.

If the owner or operator has 100 or fewer USTs, the owner or operator cannot receive more than $1,000,000 minus the deductible from the ELTF per year. If the owner or operator has more than 100 USTs, the owner or operator cannot receive more than $2,000,000 minus the deductible per year from the ELTF. The maximum amount allowed per occurrence is $1,000,000 minus the deductible.

3.10.2 Examples of Eligible Expenses

The following partial list is provided to assist owners and operators in recognizing the types of expenses eligible for reimbursement under the ELTF program. A complete listing of reasonable costs is available in 328 IAC 1-3-5.

- Costs incurred after March 31, 1988
- Administrative costs such as the following:
  - Travel, lodging, and per diem costs to be paid in accordance with the most current Indiana Department of Administration financial management circular covering State travel policies and procedures
  - Attorney fees if incurred by the owner or operator in defense of litigation in a third-party liability claim
  - Sales tax and governmental administrative fees for local, State, or federal permits necessary for corrective action.
- Investigation and remediation costs, such as the following:
  - Investigation costs, including environmental assessment, field time, report writing, and clerical support
  - Costs for soil and water sampling of petroleum and petroleum constituents in accordance with IDEM guidelines
  - Expenditures for machinery and equipment[2]
  - Materials and supplies, such as disposable protective equipment, building materials (e.g., piping and cement), and sample preservatives
  - Provision of alternate water supply[3]
- Miscellaneous costs, including any other costs deemed reasonable and necessary for corrective action or payment of third-party liability claims.

[2] These costs must be prorated based on the normal expected life of the item and the length of time the item was used for a single corrective action. In no case will the ELTF pay for purchase of machinery and equipment in excess of the market cost of leasing the item.

[3] This must be included in a CAP approved by IDEM.

3.10.3 Examples of Ineligible Expenses

The following partial list is provided to assist owners and operators in recognizing the types of expenses that are not eligible for reimbursement under the ELF program.

- Capital improvement costs, such as the following:
  - New tanks or equipment
  - Installation of new tanks or equipment
  - Bedding material for new tanks or equipment (such as pea rock, sand, or special fills used to seat or bed tanks)
  - Concrete, asphalt, or other resurfacing materials reasonably necessary for restoration but in excess of 110 percent of the total surface dimensions of the original surface material or where surface material did not previously exist
  - Property improvement
  - Higher quality surfacing than previously existed (for example, replacement of 4-inch nonreinforced concrete with 6-inch re-inforced concrete with a gravel base)
- Administrative costs such as the following:
  - Interest expenses and finance charges
  - Fines and penalties
  - Punitive or exemplary damage charges
  - Any other costs not directly related to corrective action or third-party liability or otherwise determined to not be reimbursable
  - Administrative costs and application fees paid to IDEM for participation in the Voluntary Remediation Program (VRP)
- Environmental costs such as the following:
  - Laboratory work related to

- Testing of tank contents (such as water, sludge, sand, and petroleum product) for disposal
- Analysis using unapproved testing methods
- Analysis of inappropriate constituents

– Cleanup work related to

- Removal of tank contents
- Assessment of cleanup of any material other than gasoline, natural gas condensate, jet fuels, diesel fuels, heating fuels, kerosene, crude oils, waste oils, or mixed petroleum products
- Excavation costs beyond the backfill area of the tank(s) as described in 328 IAC 1-3-5(b)(12)
- Costs associated with remediation that exceeds the minimum requirements to bring a site into compliance with state environmental standards

– Other items, such as consultant "markups" on

- General contractor expenses
- Landfill fees
- Travel
- Utility bills
- Per diem expenses

– Equipment purchases that cannot be charged to a specific site, such as drilling rigs, earth-moving equipment, photoionization detectors, explosimeters, and hand tools.

■ Miscellaneous costs such as the following:

– Business down time

– Any increased cost of cleanup with the goal of limiting business down time

– Damage caused by excavation equipment or any other equipment

– Contractor costs not directly related to corrective action activities, such as preparing cost estimates, preparing bids, accounting billing functions, computer use and time, and preparation of the ELTF application

3.10.4 Instructions for Application for ELTF Eligibility

The preapproval process determines whether a site is eligible to receive reimbursement and, if so, at what percentage the site will be reimbursed. The site must have an approved emergency action, site characteriazation, or corrective action plan before reimbursement will be made. The owner/operator must be im compliance with the eligibility requirements as outlined in 328 IAC 1-3-3. Those seeking a preapproval determination or those wishing to receive reimbursement from the ELTF should submit two completed copies of the ELTF application to the address below:

Indiana Department of Environmental Management
Excess Liability Trust Fund
100 North Senate Avenue
P.O. Box 7015
Indianapolis, IN 46206-7015

Owners and operators will be informed by letter of the status of their site's eligibility for reimbursement. Any cost(s) that are ineligible or considered unreasonable for reimbursement will be identified.

Overview of Chapter 4

- Introduction
- Eligibility
- Application Process
- VRA
- Program Limitations
- Participant Benefits
- VRP Project Considerations
- VRP Project Activities

4.0 Introduction

This chapter discusses participation in the Voluntary Remediation Program (VRP). Requirements for VRP participation are established in Indiana Code (IC) 13-25-5, the Voluntary Remediation Agreement (VRA), the voluntary remediation work plan, and the Risk Integrated System of Closure (RISC) Technical Guide and User's Guide. Pursuant to IC 13-25-5-7, RISC provides the guidelines by which the Indiana Department of Environmental Management (IDEM) will evaluate investigation and voluntary remediation work plans. The VRP provides a process for property owners, operators, potential purchasers, and third parties (participants) to voluntarily enter into an agreement with IDEM to address contaminated property. IDEM issues a Certificate of Completion and the Governor's office issues a Covenant Not To Sue to VRP participants for successfully remediated properties. These documents provide assurance that the voluntary actions will not become the subject of future IDEM enforcement. In addition, a Memorandum of Agreement with the U.S. Environmental Protection Agency (U.S. EPA) provides increased assurance that U.S. EPA will not pursue an enforcement action under the Comprehensive Environmental Response, Compensation, and Liability Act of (CERCLA or "Superfund").

The VRP was established in 1993 in response to the growing need for IDEM review and oversight of voluntary investigations and remedial actions. Indiana is thus one of the first states to pass legislation t address liability issues associated with buying, selling, and developing property contaminated by petroleum or hazardous substances. Facilitation of property transfers is a recognized benefit of successful completion of the VRP process.

Because participation in the VRP is optional, a participant can terminate a project at any point upon written notification to the VRP project manager. Property owners, potential real estate purchasers, lending institutions, and property developers benefit from the flexibility allowed for achieving project closure and the voluntary nature of the VRP. Program participation also benefits Indiana's environment through the identification and remediation of contaminated property that otherwise may not be addressed.

4.1 Eligibility

With the exceptions listed below, any person who has established property control or access and who wishes to investigate and remediate property that has been contaminated with petroleum or hazardous substances is eligible to participate in the VRP. Multiple parties can

apply to the program as co-applicants. Applicants may be deemed ineligible for VRP participation if one or more of the conditions below apply.

- A State or federal enforcement action is pending concerning the remediation of hazardous substances or petroleum described in the application.
- A federal grant requires an enforcement action at the site.
- The condition of the hazardous substances or petroleu described in the application constitutes an imminent and substantial threat to human health or the environment.
- The application form is not complete.

Applicants that have already completed remediation efforts are also potentially eligible for the VRP provided that none of the criteria listed above applies. Consistent with requirements in IC 13-25-5-7(c), participants must submit documentation that project closure activities satisfy VRP reporting and performance requirements and are consistent with RISC. If a project enters the VRP after remediation is complete or after an investigation suggests that no further action is required, IDEM still requires the collection of confirmation samples to determine if remedial objectives have been achieved. The purpose o confirmation sampling is not to recharacterize the area but to gather a limited number of samples to confirm previously submitted results.

4.2 Application Process

The first step in the VRP application process is to complete and submit a VRP application form with a $1,000.00 application fee. Politica subdivisions are not required to submit a fee. Application forms are available at IDEM's Office of Land Quality and online a http://www.state.in.us/idem/olq/programs/vrp/index.html. Upon receipt of the fee, the Cashier's Office will provide a receipt to the applicants. The VRP cannot process the application until the fee is received. This fee is held until project completion or termination, after which time it will either be refunded in full or applied toward any outstanding payments. The unexpended portion of the application fee will be refunded.

The second step in the application process begins with the assignmen of a unique project number to the application form and concludes with an internal agency enforcement check concerning the proposed VRP project.

Information provided on the application is used to determine an applicant's eligibility in the VRP. It also identifies the VRP applicant, provides an initial summary of project conditions, and preliminarily

defines the scope of the investigation and remediation. Pursuant to IC 13-25-5-2, the application is confidential until IDEM and the applican sign the VRA.

The VRP has 30 days to determine the eligibility of an applicant based on the criteria listed above. Incomplete applications will be returned to the participant within 45 days of receipt with missing information identified. After the appropriate revisions have been made, a participant may resubmit the application. A resubmitted application does not require an additional application fee. Upon application approval, the VRP will send a formal acceptance letter to the applican contact person identifying the assigned VRP project manager.

4.3 Voluntary Remediation Agreement

Shortly after the participant is accepted into the program, the projec manager will send the participant a standard VRA and a nonbinding VRP oversight cost estimate. The VRA is a standard document that identifies the obligations of both the participant and IDEM. During the investigation VRP participants are expected to adhere to the standards set forth in the VRA. The participant can sign the VRA and return it to the VRP for final approval or suggest a modified VRA. In some cases, IDEM may agree to make project-specific alterations to standard VRA. Of course, many aspects of the program are governed by statutes and cannot be altered by the VRA. However, circumstances may make changes to the VRA mutually beneficial. One such case involves a non-owner VRP participant. If a previous owner wishes to remediate property currently owned by another party (or about to be purchased by a prospective purchaser), the VRA can be changed to extend temporary liability coverage to the current owner. Also, at the participant's discretion, the VRA can be revised to specify more stringent closure requirements. Such changes can be usefu during property transfer.

The participant's name will be listed in the caption and signature block of the VRA. The VRA, Certificate of Completion, and Covenant Not To Sue will be issued in the name of the participant as it is indicated in the application. If the participant wishes to have the Certificate o Completion or the Covenant Not To Sue issued to a party other than the participant, the participant must indicate this preference on the application or on the VRA so that appropriate steps can be taken.

The participant must submit a proposed remediation work plan (see Appendix 1.2 of the RISC User's Guide) no later than 180 days after the VRA is signed. An extension may be granted and reflected in the VRA if mutually agreed upon by the VRP and the participant. In addition, the participant will agree to reimburse IDEM for costs incurred to review work plans and reports and to provide projec oversight. The VRA will provide the participant with an estimate of review and oversight costs and a payment schedule. The VRA also establishes deadlines for the completion of milestone tasks.

4.4 Program Limitations

Although the VRP can be used to address most contamination scenarios, it is inappropriate in some cases. All limitations are based on the program's statutory framework, which may prevent participant from completing the VRP. Examples of such limitations are discussed below.

4.4.1 Off-Site Source of Contamination

If the participant cannot or does not desire to gain access necessary to remediate an off-site contamination source, the participant will have difficulty performing the investigation and remediation necessary to obtain a Certificate of Completion and a Covenant Not To Sue. If a source of ground water contamination is not on the participant's property and either property access or control is not desired or provided to the VRP participant, the participant's site may qualif under IDEM's "Property Containing Contaminated Aquifers" nonrule policies, OER-0008-NPD, 20 Ind. Reg. 1674 (March 1, 1997) (for hazardous substances or petroleum), or WASTE-0038-NPD, 23 Ind. Reg. 2141 (May 1, 2000) (for underground storage tanks [UST]). These policies state that if certain conditions are met, IDEM will decline to bring an action against a qualified site.

4.4.2 Resource Conservation and Recovery Act

The VRP may not be appropriate for meeting obligations or responsibilities under the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. 6901 *et seq*. (United States Code). Obligations that may preclude VRP participation can encompass the duty to meet any permit conditions, including, but not limited to, financial responsibility, closure, post-closure, or corrective action requirements. In addition, neither IC 13-25-5-18(e), the Certificate of Completion, nor the Covenant Not To Sue can prevent IDEM from bringing an enforcement action to compel the VRP participant to perform closure, post-closure, or corrective action, even if the remediation work plan addresses the contaminants or property. However, the VRP process

can be used in conjunction with formal or informal resolution of these issues.

4.4.3 Natural Resource Damages

Neither the VRA, the Certificate of Completion, nor the Covenant Not To Sue relieves the VRP participant of any natural resource damage liability under the following authorities: 42 U.S.C. 9601 *et seq.* (CERCLA); 33 U.S.C. 2701 *et seq.*; IC 13-25-4-8; and Indiana common law. Natural resource damage liability applies even if the remediation work plan or VRA addresses natural resource damages.

4.4.4 Other Limitations

The participant can be removed from the VRP for failure to (1) submit a remediation work plan in a timely manner, (2) substantially compl with the work plan, or (3) pay IDEM's administrative costs. Although the VRP does not require the participation of other regulatory programs, it may be possible to fulfill another program's requirements under the VRP. Because each regulatory program has its own requirements, prospective VRP participants should check with the appropriate program personnel or seek an attorney to discuss these requirements.

4.5 Participant Benefits

Program participants enroll in the VRP for different reasons, but common goal of all participants is to reduce liability for property contaminated by petroleum or hazardous substances. The Certificate of Completion and the Covenant Not To Sue provide assurance that the voluntary actions will not become the subject of future ID enforcement. In addition, a Memorandum of Agreement with the U.S. Environmental Protection Agency (U.S. EPA) provides assurance that U.S. EPA will not pursue an enforcement action under the CERCL with respect to remediation conducted under the VRP.

The flexibility of the VRP allows participants to choose to remediate less than all of the potential contamination on their properties and, within reason, set their own timetables for remediation completion. These considerations influence the resulting liability coverage and are best formulated prior to formal VRP enrollment. Participation in the VRP can increase the value of land and provide a means for responsible parties to address contamination caused on other properties. The VRP can also reduce the threat of federal enforcement actions and facilitate property transfers. Examples o such benefits are discussed below.

4.5.1 Reduce Threat of Federal Enforcement Actions

As stated above, the Memorandum of Agreement states that when an environmental project in Indiana has been issued a Certificate o Completion for the project, U.S. EPA Region 5 will not plan or anticipate any federal action under CERCLA. This assurance remains applicable unless exceptional circumstances cause the project to pose an imminent and substantial threat to human health or the environment. In all cases, the U.S. EPA Region 5 decision will be based strictly on information available at the time of IDEM's determination. This provision does not extend to sites listed on the National Priorities List (NPL) or currently subject to orders or enforcement actions under CERCLA. More information about the Memorandum of Agreement is available at the following Interne address: www.state.in.us/idem/olq/programs/vrp/vrp_moa.pd .

U.S. EPA will continue to work with IDEM to address any concerns associated with federal activity under CERCLA so as to encourage the financing, transfer, and appropriate redevelopment and use o industrial and commercial properties. In addition, U.S. EPA wil continue to provide technical assistance and, at its discretion, financial support to local and State government in order to facilitate the revitalization of contaminated or potentially contaminated properties in Indiana.

4.5.2 Facilitate Property Transfer

The VRP is useful for facilitating property transfers. The flexibility o the VRP allows the participant to propose a voluntary remediation work plan that will provide the desired level of coverage. It is up to the participant and other parties interested in the property transfer to (1) propose the scope of work associated with the property, (2) identify areas to be addressed (which determines liability coverage), and (3) decide when in the VRP process to transfer the property.

The VRA can be altered to allow the parties to reference the VRA in a property transfer agreement. In addition, VRP staff can provide interested parties with a letter that updates the status of the project.

4.6 VRP Project Considerations

In addition to an understanding of the VRP's administrative steps, knowledge of RISC is paramount in defining the contamination and evaluating the risks associated with the property and in projecting

investigation and remediation costs. VRP provides the following options for managing risks posed by environmental contaminants:

- Using traditional remediation methods to achieve default RISC closure levels
- Developing appropriate closure levels using default and nondefault risk assessment
- Allowing higher levels of contamination to remain in place when exposure can be prevented

Program participants must also consider both VRP oversight costs and environmental consultant costs necessary to document remediation efforts. VRP oversight may require IDEM contractor involvement. The extent of technical support will depend on the anticipated complexity of the investigation and remediation as described in the VRP application. Generally, increases in project complexity and scope result in increased cost in order to demonstrate that closure levels have been met.

VRP and contractor technical reviews are more cost-efficient when participants follow the standard report outlines in Appendix 1 of the RISC User's Guide. Re-evaluating inadequate reports, expanding project scopes of work, and other additions all cause increased VRP oversight costs. The VRP remains sensitive to investigation and remediation cost burdens placed on participants and is committed to minimizing oversight costs.

VRP Process Overview

- ✧ Presampling Activities
- ✧ Optional Area Screening
- ✧ Investigation
- ✧ Remediation Work Plan Preparation
- ✧ CRP Preparation
- ✧ Remediation Work Plan Implementation
- ✧ Remediation Progress and Compliance Reporting
- ✧ VRP Closure Locatio Information
- ✧ Land-Use Restrictions
- ✧ Project Completion
- ✧ Closure Report Preparation
- ✧ Issuance of Certificate of Completion
- ✧ Issuance of Covenant Not To Sue

Because the VRP was designed to be a self-supporting program, participants will be assessed an additional amount of ten (10) percen of IDEM's total administrative costs. IDEM has determined that this is necessary for the effective implementation of VRP. Participants must pay all billed amounts before the Certificate of Completion and Covenant Not To Sue are issued. IDEM issues these documents as soon as the participant has performed the required work, regardless of whether final accounting of project costs has occurred. Therefore, project billing may continue even after the Certificate of Completion and Covenant Not To Sue have been issued.

If the VRP project is terminated for any reason, the participant agrees to reimburse IDEM for all of its administrative costs reasonabl incurred to the time of project termination. IDEM agrees to reimburse the participant any unused portion of the application fee.

4.7 VRP Project Activities

VRP participants should begin project activities by determining which investigations and remediations are either required by regulations or warranted for the liability coverage sought. Presampling activities, area screening, and determination of the nature and extent o contamination are key in determining the appropriate course of action. Chapters 2, 3, and 4 of the RISC Technical Guide provide detailed guidance regarding these tasks. These and other VRP project activities are discussed below. In determining the scope of the project, participants should keep in mind that the Covenant Not To Sue wil apply only to the chemicals and media addressed in the remediation work plan.

4.7.1 Presampling Activities

All appropriate RISC presampling activities discussed in Chapter 2 of the RISC Technical Guide are required under the VRP. VRP participants are required to evaluate potential source areas b compiling existing information about the site and surrounding areas. Efforts must be made to gather pertinent information concerning past site management practices and potential related impacts on human health and the environment.

Much of this information can be gathered during a Phase I investigation such as the widely recognized American Society for Testing and Materials' (ASTM) Phase I investigation (ASTM E-1527-97 or E-1528-96). The ASTM Phase I investigation can supplement information required by RISC guidance. Although no formal report is submitted during presampling or Phase I activities, the VRP will require the bulk of this information in an investigation report (see Appendix 1.1 of this User's Guide) or in the investigation portion of the voluntary remediation work plan.

Presampling activities can help define the project scope of work b identifying areas unlikely to be contaminated and areas known to be or that may be contaminated. Although the VRP Covenant Not To Su will only cover areas actually investigated and, if necessary, remediated, presampling can be used to identify areas that do not pose a concern to parties involved in a real estate transaction. In addition, participants can focus their investigative and remediation efforts by considering area classifications along with the level of regulatory coverage desired and the type of remedy selected (such as projec closure with or without institutional controls),. Presampling activities can also preliminarily identify the size of contaminant source areas. This is an important consideration when using the RISC default closure tables (see Appendix 1 of the RISC Technical Guide).

Contaminant source areas greater than 0.5 acre must either be characterized using the statistical methods discussed in Chapter 7 of the RISC Technical Guide or by using alternative statistical methods identified in the work plan.

Presampling activities also include determining the level of liability coverage desired, evaluating existing information, area classification, selecting the chemicals of concern and environmental media.

4.7.1.1 Determining Level of Liability Coverage Desired

The liability coverage granted through the VRP Covenant Not To Sue is limited to the matters addressed in the voluntary remediation work plan. The participant should propose the scope of work of the remediation work plan based on the level of liability coverage desired. Contamination can be "addressed" through risk assessment, active remediation, or a combination of risk assessment and remediation. Participants may address less than the entirety of a source area i adequate demonstration is provided to exclude chemicals of concern or particular environmental media.

Specific areas and COCs to be addressed must be identified in the voluntary remediation work plan, which is incorporated into the Covenant Not To Sue. If liability coverage is desired for a specific area, independent laboratory confirmation sampling is necessary t verify that the area meets appropriate closure objectives.

The remediation work plan must address contamination that emanates from a participant's facility, even if the contamination extends off of the "site" as specified in the VRP application. Although the VRP might not require remediation in all cases, the remediation work plan must identify and address all contamination exceeding residential closure levels. If the owner of a neighboring property will not grant property access for remediation, IDEM may work with the participant to gain access. If the participant cannot reasonably gain access to the neighboring property, IDEM may, at its discretion, allow the voluntary remediation work plan to address property controlled by the participant only. This will limit the resulting liability coverage to the work actually performed. This exception does not apply to off-site deed restriction or other land-use restriction requirements.

4.7.1.2 Evaluating Existing Information

To better identify applicable project objectives, the assessment o environmental conditions must address past and current site practices and associated environmental concerns. All existing data concerning environmental contamination should be assessed. Evaluating this information before sampling saves time and money because relevan information can lead to better project screening and sampling plans. Often, a Phase I environmental site assessment (ESA) has been performed on the property in accordance with ASTM guidelines (ASTM E-1527-97 or E-1528-96). An ESA report is an excellent source of background information. The ESA report can supplemen additional information required by RISC guidance.

Participants may also use historical information to make management decisions concerning area classifications. A participant may choose to exclude parts of a site from sampling activities (such as screening, investigation, or confirmation) based on historical knowledge; however, the VRP will not extend liability coverage to the excluded areas. RISC allows the use of efficient and technically valid approaches to achieve either sitewide or incident-specific projec closure.

4.7.1.3 Area Classification

During formulation of a project's investigation work plan, participants decide the classification of areas depending on the likelihood o contamination (known, unlikely, or may be). Area classifications should be initially based on historical records, knowledge o operational units and processes, and existing sampling information. This information can lead to more efficient sampling designs and can be modified as data become available. Based on the information gathered during the presampling investigation, all areas of the site must be classified into one of the following three categories:

- Areas unlikely to be contaminated
- Areas known to be contaminated
- Areas that may be contaminated

Areas unlikely to be contaminated are portions of a site where there is no reason to suspect contamination. Available historical site data is used to make this determination. Closure is not provided on these areas unless analytical information is obtained and made available for review.

Areas known to be contaminated are areas where contaminan releases are known to have occurred. Previous sampling data, records that document site contamination, visibly stained soils, soil odors, and other investigative data that indicate contamination can be used as a basis for this classification. If the nature and extent determination is complete, appropriate sampling data can be evaluated with regard to the direct contact and migration to ground water pathways. The variability of contaminant concentrations within a known area of contamination will dictate the scope of the sampling plan. Subsequent investigative efforts can focus on this area, providing a cost-effective means to limit future liability. Leaking underground storage tanks (LUST), past environmental spill locations, wastewater retention ponds, and aboveground storage tanks (AST) are all examples of common areas of known contamination or areas discovered to be contaminated during traditional environmental records research. As with other known areas of contamination, historical or currently known information (including information obtained through RISC screening) is often adequate to determine whether the areas wil require additional investigation. Therefore, information required fro VRP program participants primarily focuses on these sources o information.

Areas that may be contaminated are areas that cannot be classified in either of the other two categories. Significant data gaps or ambiguous or inconclusive information exists for these areas. Gas stations with UST closures, industrial process lines, and areas o unsubstantiated past environmental threats are all examples of areas that may be contaminated. Once identified as an area that may be contaminated, the area is screened and the screening results compared to RISC default closure levels to determine if further investigation is necessary. If the likelihood of RISC default level screening failure is great, the VRP participant may decide to skip area screening and proceed to defining the nature and extent of contamination (see Chapter 7 of the RISC Technical Guide.

Although choosing to address areas known to be contaminated may provide the initial impetus for entry into the VRP, it does not preclude IDEM from requesting an expansion of the VRP participant's investigation to include other potential environmental threats or impacts. Information gathered from historical records, knowledge o waste streams, and operational practices may be deemed a cause for further investigation. The potential for threats to human health or the environment is also considered just cause for IDEM to request an expansion of the investigation scope.

VRP participants have the choice of addressing the entire facility or specific source areas. If sitewide coverage is desired, the VRP will

assume that all areas under all three classifications will be addressed in the remediation work plan. All contaminants detected within these areas will be considered part of the scope of the remediation work plan, which must fully encompass the specific contaminant conditions associated with each area.

The participant can use screening and other methods to exclude portions of the facility from investigation and remediation. However, liability coverage under the Covenant Not To Sue will only extend only to areas actually addressed through sampling and, if necessary, remediation.

4.7.1.4 Selecting Chemicals of Concern and Environmental Media

The VRP provides a means to develop a flexible yet reasonable approach to including or excluding particular chemicals and environmental media (such as soil and ground water) from further investigation and remediation. The VRP approach of selecting COCs and environmental media can also be used by buyers and sellers o property and other interested parties to determine which areas of a facility require investigation and remediation.

Successful VRP Project Formulation Steps

1. Correctly select an area(s) for a soil and ground water investigation
2. Identify an inclusive preliminary chemicals of concern list for soil & ground water
3. Successfully demonstrate the elimination process for certain chemicals of concern and media from further investigative work
4. Coordinating area(s) confirmatory sampling events with VRP for project closure

IDEM's flexibility in allowing the selection of media and chemicals targeted for investigation is aimed at balancing the benefits of flexibility in voluntary cleanups with efficient and effective protection of human health and the environment. An area, medium, or chemica has not been "addressed" unless it is targeted for investigation and possible remediation under the voluntary remediation work plan. The participant can choose to investigate and address these areas, media, or chemicals in order to obtain liability protection for them.

Ordinarily, VRP participants address all of a known contamination event. VRP participants may also pursue closure for an entire facility, including areas unlikely to be contaminant sources and areas that could be contaminated (but are not known to be). Because the VRP process allows participants to select specific areas for environmenta investigation and remediation, liability coverage can be provided onl for the areas that have been investigated and, if necessary, remediated. Given a particular source area, participants can eliminate from further consideration chemicals of concern, environmental media, or exposure pathways by providing an adequate demonstration that they do not present an undue risk. Adequate demonstration must be consistent with RISC guidance.

A participant choosing to address a specific area must begin by determining all chemicals known or reasonably suspected to have been

released to the soil and ground water. The participant then creates a list of COCs. This initial list should include compounds used, treated, stored, or disposed of at the specific area(s). Chemicals reasonabl suspected to have been released include all chemicals typically found with the release to be addressed (for example, benzene, toluene, ethylbenzene, xylene, and possibly methyl-tertiary butyl ether (MTBE) for petroleum storage tank releases) and breakdown or "daughter" products for each chemical known to be released. Appendix 4.1 of this User's Guide discusses specific categories of COCs for LUST petroleum projects. Specific chemicals can then be eliminated fro further investigation under a variety of situations. Examples of such situations include:

- screening or other investigation (either during the VRP process or before entry into VRP) demonstrates that the chemicals are not located above cleanup objectives in soil or detected in ground water.
- the risk of exposure of humans and the environment to the chemicals is low based on current and future land use, considering land-use controls, laws, or other restrictions
- the participant cannot reasonably gain access to off-site property where the chemicals are located
- remediation is not technically or economically feasible.
- the participant is neither responsible for the contamination nor liable for cleanup under State or federal law

Participants may "adequately demonstrate" the elimination fro further consideration of a particular medium or exposure pathway by establishing one or more of the following:

- the current degree of contamination or site conditions effectively deter contaminant transport to a particular mediu
- there is a lack of contribution to or liability for contamination, such as contamination from an off-site source
- ground water contamination presents minimal risk to human health and the environment, considering ingestion of water, dermal exposure, indoor air, and surface water resources
- soil contamination risks presents minimal risk to human health and the environment, considering direct contact, ingestion, inhalation, or ground and surface water resources
- future land or ground water use restrictions or ordinances will limit exposure

During the compilation of information required for VRP reporting, adequate criteria for eliminating from further consideration a particular media will become apparent. Sampling data, historical information, and other report information can help build a case for demonstrating

that certain environmental media or exposure pathways can be eliminated. Ecological risks posed by the area or site must also be considered. Unsupported decisions not to address particular chemicals, contaminated media, or exposure pathways resulting from a release or area to be addressed will not be accepted because such decisions are not sufficiently protective of human health or the environment.

Participants have "adequately demonstrated" that a medium does not warrant further investigation if the particular medium has passed RISC screening. If participants choose not to conduct screening, the ful nature and extent of contamination must be determined for either the area of a facility or the entire facility. The nature and exten determination may demonstrate that the proposed scope of the investigation can eliminate from further consideration certain media or exposure pathways. If a particular source area impacts surface and subsurface soil and contaminant concentrations are high enough to warrant ground water investigation, the VRP project manager has the discretion to request an expanded scope of work.

Specific areas and contaminants to be addressed will be documented in the remediation work plan, which is incorporated into the Covenant Not To Sue. If liability coverage is desired for a specific area, independent laboratory confirmation sampling is necessary to provide verification that the specific area meets appropriate closure objectives.

4.7.2 Optional Area Screening

Area screening is an option for all VRP participants. This option involves comparing collected data to RISC default closure levels to determine if further investigative work is necessary. VRP participants must provide any and all screening information in the investigation report or remediation work plan as detailed in Appendix 1 of the RISC User's Guide. For sites involving petroleum contamination from a discrete source (such as an underground or above ground tank), Appendix 4.2 of the RISC User's Guide provides a two-step procedure for screening subsurface soils. Regardless of a VRP participant's performance or nonperformance of area screening, confirmation sampling will still be required to verify environmental conditions to achieve VRP project closure through the Covenant Not To Sue.

The purpose of screening is to determine the presence of contaminants at concentrations exceeding the RISC closure levels. VRP participants with a high level of confidence that the proposed VRP project area will pass RISC default screening evaluations can proceed to obtain closure through area screening. Because only discrete (noncomposited) samples may be used for confirmation sampling of volatile chemicals,

the Chen Test is the default method for confirmation sampling of volatile compounds. For non-volatile compounds, either the Max Tes or the Chen Test may be used. (See Chapter 6 of the RISC Technical Guide.)

The VRP participants must coordinate split confirmation sampling. I confirmation sampling results demonstrate compliance with remediation objectives, the participant may achieve closure. In this case, the determination of the nature and extent of contamination is not required. Participants who have information that suggests that the area is contaminated at concentrations exceeding RISC default closure levels may forgo area screening and proceed to a determination of the nature and extent of contamination and eventually project closure. VRP participants who do not have a strong historical basis to judge an area's environmental concerns should conduct area screening to narrow the focus of any remedy required.

Ground water screening may not be necessary for projects with adequate demonstration that ground water liability coverage is not necessary. However, if ground water is to be included in liability coverage, a thorough determination of the nature and extent of possible ground water contamination and any necessary remediation must be completed prior to the issuance of a Certificate of Completion and Covenant Not To Sue. Ground water screening is insufficient for closure in VRP.

4.7.3 Investigation

All reporting requirements identified in the Investigation Report (see Appendix 1.1 of the User's Guide) apply. Any presampling or screening information should be included in the investigation report. VRP participants can either submit an investigation work plan or an investigation report (see Appendix 1.1). Regardless of which type o document is submitted, VRP participants are asked to provide three copies to the VRP project manager to facilitate technical review. The VRP will provide technical comments within approximately 60 days. VRP participants who elect not to submit an investigation work plan or investigation report must document the objectives, rationale, and procedures followed during the investigation, and investigation findings in the voluntary remediation work plan.

4.7.4 Remediation Work Plan Preparation

The primary purpose of the remediation work plan is to provide a basis for IDEM to evaluate the remedy proposed for the project. In addition, the remediation work plan is subject to a 30-day public notice period, which serves to inform interested parties of the remedial plans.

Participants must comply with any VRP public participation standards or guidance applicable to the VRP. The remediation work plan also establishes the schedule for implementation of remedial activities, which allows IDEM to coordinate oversight activities with the participant. VRP participants must submit four copies of the remediation work plan to the assigned VRP project manager for technical review. All reporting requirements identified in Appendix 1.2 for the remediation work plan are also required.

The remediation work plan must specify project closure objectives. I the objectives are less stringent than residential standards (for example, commercial/industrial standards), the remediation work plan must also specify the property uses that must be restricted to be consistent with the assumptions used to generate the closure objectives. Satisfaction of the Ground Water Quality Standards Rule, 327 IAC 2-11, does not necessarily eliminate the need for property or land-use restrictions or other remedial action.

4.7.5 Community Relations Plan Preparation

Meaningful community participation is necessary for the success o any environmental remediation. Participants are encouraged to formulate a community relations plan (CRP), in cooperation with the IDEM project manager, in order to inform the community about the project as well as respond to public questions. In addition to the formal processes described in the CRP, many VRP participants find that informal meetings and discussions are effective in preventing complications sometimes caused by an uninformed public. Such meetings are especially appropriate for neighbors and sensitive community institutions. The CRP should address the needs of both the VRP participant and the community and must be consistent with the VRP's community relations nonrule policy, OLQ-XXXX-NPD, 20 IC XXXX (Month X, 2000).

4.7.6 Remediation Work Plan Implementation

The VRP participant must notify IDEM within 60 days of work plan approval of the intent to proceed with plan implementation. Commencement of the work contemplated in the work plan before the work plan is approved is done at the participant's risk. Oversight of the remediation work plan is accomplished through a combination of written progress reports and IDEM field oversight. A schedule for progress reporting is required in the remediation work plan.

4.7.7 Remediation Progress and Compliance Reporting

If remediation is necessary, all reporting requirements detailed in Appendix 1.3, Remediation Progress Report, are required. However, if remediation is not warranted because constituents are present below either background or the closure levels specified in the remediation work plan, this reporting requirement is not applicable.

Remediation progress reports (see Appendix 1.3) update the VRP project manager and other interested parties about the remedial activities. These reports shall be submitted at least quarterly. Confirmation samples (split with the VRP) are required to be collected to verify that the specified closure levels have been achieved. Three copies of each remediation progress report should be submitted to the VRP project manager.

4.7.8 VRP Closure Site Location Information

Accurate site location information is required for all VRP sites before the Certificate of Completion can be issued. This information is used in the Certificate of Completion and its attachments to accuratel identify the site location. For this purpose, a clean (absent of al headers, footers, and watermarks) legal description of the site must be provided. At a minimum, Universal Transverse Mercator (UTM) coordinates for property access points along the property boundary (such as a driveway or property gate) must be provided. Additionally, the participant must accurately delineate the source areas addressed in the remediation work plan, regardless of whether they are within or outside of the facility boundary

Accurate information must be provided for all UTM coordinates, regardless of how they are collected. VRP staff may provide this service if requested by the participant. More information may be required for certain remedial projects.

The participant may either choose to professionally survey the specific area or request that the VRP establish the boundaries of the area(a) using a global positioning system (GPS) instrument. Manufacturer specifications and internal IDEM guidance on use of GPS instruments is on file at IDEM. Although IDEM's use of GPS instruments is not a registered professional survey, it will provide the area locations with acceptable accuracy.

4.7.9 Land Use Restrictions

The VRP requires a land-use restriction for all affected properties (both on-site and off-site) not demonstrated to have achieved residential cleanup objectives. A land-use restriction is a way to ensure the continuing viability of land use and exposure assumptions made during the selection of the remedy in the remediation work plan. A land-use restriction often comes in the form of a deed restriction, a land-use rights agreement (that is, the grant or surrender of ground water use or developmental rights), or, in some cases, a law or ordinance. At a minimum, future land use of the property should be restricted to industrial uses for sites that do not satisfy residential closure objectives.

Land-use restrictions proposed by a participant must be **enforceable** and must have a degree o **permanence**. In addition, a land-use restriction must provide the public wit **constructive notice** about the existence of the land-use restriction. U.S. EPA's "Land Use in the CERCLA Remedy Selection Process" guidance documen (Appendix 7 of the Technical Guide) provides further discussion.

Enforceability ensures that land use that violates the use restriction can be stopped. Constructive notice ensures that all people are deemed to have knowledge of the land-use restriction and is often accomplished by recording a document in the County Recorder's office. All people are deemed to have constructive notice of laws, administrative rules, and ordinances. Constructive notice (1) ensures that occupants, prospective purchasers, and lenders are aware of the use restriction and (2) facilitates use consistent with the land-use assumptions. Types o land-use restrictions that provide constructive notice include recorded instruments, laws, rules, and ordinances. Because an environmenta notice is not enforceable, it typically is not sufficient for VRP purposes as a land-use restriction. Similarly, zoning, while an ordinance, is not permanent enough to qualify as a land-use restriction because zoning restrictions are easily changed and variances are often freely granted.

The remediation work plan must specify land-use assumptions made in remedy selection; however, the specific type of land-use restriction need not be specified. All land-use restrictions for off-site properties must be in place when the closure report is submitted. Land-use restrictions for on-site properties must be in place before the Certificate of Completion is issued except for restrictions that are recorded instruments.

The VRP allows on-site deed restrictions or other instruments to be recorded simultaneous with the Certificate of Completion. The VRP also allows the participant to decide when the land-use restriction is

put in place. Failure to secure a land-use restriction is a cause for denial of project closure. The VRP encourages participants to work with their project managers to select the appropriate land-use restriction for a site and to be inventive in developing use contro strategies.

4.7.10 Project Completion

Closure Requirements

- ✧ Confirmation sampling
- ✧ Submission of Closure Report
- ✧ Initiation of any off-site institutional control
- ✧ Recordation of Certificate o Completion and any on-site institutional control

Guidance on closing VRP sites is presented in the RISC Technical Guide, Chapter 6. Consistent with RISC policy, the VRP will issue a Certificate of Completion when a permanent remedy ensures that contaminant levels meet the respective closure values and when ground water monitoring demonstrates that the ground water continues to meet closure values after eight consecutive quarters of ground water monitoring. Closure with institutional controls may be granted when i is demonstrated that the ground water plume is stable or shrinking. Demonstration of plume stability requires 3 to 7 years of monitoring for petroleum releases and 7 years of monitoring for chemical releases. However, with IDEM concurrence, the participant may propose alternative models for plume dynamics to demonstrate a stable or shrinking plume in less time.

VRP policy requires that confirmation samples be split with IDEM for all project closures as an independent verification that conditions meet closure criteria. If a participant enters the VRP before the nature and extent of contamination has been determined, the participant may request that IDEM split samples with them during optional project screening or investigation activities if contaminant levels are not expected to exceed RISC default closure levels. This strategy wil prevent the added expense of remobilizing sampling crews to demonstrate closure. Of course, if confirmation sampling results do not meet remediation objectives, more remediation work will be required, along with subsequent confirmation sampling. I remediation is required, confirmation samples will be collected after completion of the remedial process to confirm closure.

If a project enters the VRP after remediation is complete or after an investigation suggests that no further action is required, IDEM will still require the collection of a limited number of confirmation samples as an independent verification that conditions conform to closure levels. In this case, the intent of confirmation sampling is not to recharacterize the area(s) but rather to confirm previously submitted data.

Some VRP projects may require off-site land-use restrictions. Consistent wit Section 4.7.9 of this chapter, separate land-use restrictions are required under the VRP for all properties affected b on- and off-site contamination. Although the remediation work plan need only indicate what type(s) of land-use restrictions will be placed on the affected properties, evidence of the placement of off-site land-use restrictions must be submitted to IDEM before the Certificate of Completion is issued. On-site land-use restrictions may be recorded concurrent with the Certificate of Completion. Evidence of recording, such as an affidavit or file-stamped deed restriction, can be provided as proof that a deed restriction was recorded for all affected property.

4.7.11 Closure Report Preparation

When a project is completed, the VRP participant will be asked to submit a closure report (see Appendix 1.4). All itemized reporting requirements identified in the closure report outline format in Appendix 1.4 apply. Three copies of the closure report must be submitted to the VRP project manager for review.

The primary purpose of the closure report is to document the completion of activities identified in the remediation work plan. The closure report must also demonstrate that all land-use restrictions for off-site affected property are in place. The closure report provides important information about the performance of the remediatio system, how the project area was restored following remediation, and other information necessary to demonstrate that the remediation was successful. Section II of the closure report requires comparison between VRP-collected split sample results and participant-collected split sample results. Prior to closure report submission, the participant should contact the VRP project manager and request confirmation sample results. In addition to these reporting requirements, the participant must demonstrate the notification of parties as required by the community relations nonrule policy document, OLQ-XXXX-NPD, 20 IC XXXX (Month X, 2000). A copy of the written notification and a list of recipients must be provided as an attachment to the closure report.

Upon receipt of the closure report, IDEM may schedule a final site inspection. If the report and inspection confirm that remediation is complete, IDEM will prepare a Certificate of Completion and a Covenant Not To Sue for the remediated areas and activities.

4.7.12 Issuance of Certificate of Completion

Once the voluntary remediation project has been successfull completed and payments to IDEM have been made for all billed oversight costs, IDEM will issue the Certificate of Completion. The Certificate of Completion and any on-site land-use restrictions must be recorded with the County Recorder. Once IDEM has received proof o the recorded Certificate of Completion and all oversight payments, IDEM will prepare a Covenant Not To Sue for the Governor's Office. In accordance with IC 13-25-5-18(a), the Covenant Not To Sue bars suit against the participant and successors in title to the VRP site for claims arising under Chapter 13 of the Indiana Code for matters addressed in the remediation work plan. In addition, pursuant to IC 13-25-5-20(b), the program participant, upon receipt of the Certificate of Completion, is not liable for claims for contribution concerning matters addressed in the remediation work plan.

The provisions of the VRA are satisfied when IDEM gives the participant written notice, in the form of a Certificate of Completion, that it has demonstrated to IDEM's satisfaction that all of the terms o the VRA have been completed, including the selection and implementation of a remedial action. The participant remains responsible for record preservation and payment of any remaining administrative costs.

A person who receives a Certificate of Completion shall file a copy o the certificate and its attachments to the recorded deed for the property in the Recorder's Office of the county in which the remediation took place. In addition, the participant must ensure that any land use restrictions are in place. A deed restriction or other recorded land use restriction for on-site property can be recorded simultaneously with the Certificate of Completion. The County Recorder's Office for the county in which the VRP project is located can provide specific guidance on recording issues as well as written proof of the recording.

4.7.13 Issuance of Covenant Not To Sue

After successful project completion, the Governor's Office will issue the Covenant Not To Sue for the contaminants listed in the remediation work plan. Only listed contaminants will be reflected in the attachments to the Covenant Not To Sue. Prior to the issuance o the Covenant Not To Sue, proof of recording of the Certificate of Completion must be provided to the VRP project manager. Upon receipt of written proof of the recording, the VRP will prepare a Covenant Not To Sue and forward it to the offices of the Attorne General and the Governor for signature. By statute and by its own terms, the covenant protects the recipient of the Certificate of

Completion and any party who subsequently acquires the subject property. Upon issuance, neither IDEM nor a third party can bring an action against the participant under the State's environmental laws (Title 13 of the Indiana Code) for matters addressed in the remediation work plan.

The covenant does not relieve the participant of all liability. The participant may still be liable for post-closure or corrective action requirements under RCRA, natural resource damages, nuisance, trespass, and other common law claims, and criminal actions. In addition, the State may not release a participant from liability with regard to CERCLA claims. Although the Memorandum of Agreemen states U.S. EPA's policy, it does not and cannot stop suits brought b third parties pursuant to CERCLA for contribution actions against a participant. However, an action for contribution under CERCLA can only be brought for actual response costs incurred by a third party. The likelihood of such a claim is slight for most VRP projects.

Overview of Chapter 5

5.0 Introduction

The State Cleanup Program (SCP) was created in 1989 to manage projects not included in the federal Superfund Program under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 *United States Code* (USC) 601 *et seq.* Although the SCP is modeled after the Superfund Program, it differs in many respects. First, unlike the Superfund Program, the SCP has jurisdiction over petroleum releases in addition to releases of hazardous substances. Also, the SCP follows aspects of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 *Code of Federal Regulations* (CFR), Part 300, as well as the Risk Integrated System of Closure (RISC). By applying components of all three programs, the SCP can handle sites of the same environmenta magnitude as Superfund Program sites using a more streamlined approach. Finally, the SCP is administered by the State, with no federal involvement or funding. Examples of SCP sites include petroleum terminals and refineries, abandoned landfills, former lead smelting and battery recycling sites, and other industrial sites.

The legal authority for the SCP is Indiana's Hazardous Substances Response Trust Fund, Indiana Code (IC) 13-25-4; Petroleum Releases, IC 13-24-1; and the Indiana Scoring Model (ISM), 329 Indiana Administrative Code (IAC) 7-1.

The Hazardous Substances Response Trust Fund is utilized for cleaning up sites contaminated with hazardous substances. It also establishes liability for potentially responsible parties. Responsible parties and the State's Hazardous Substances Response Trust Fund provide funding for these cleanups. In addition, IC 13-25-4 states that the Indiana Department of Environmental Management (IDEM) may recover the costs of removal or remedial actions when such actions are performed in accordance with the NCP. IC 13-24-1 authorizes IDEM to require cleanup of petroleum contamination. Both the Hazardous Substances Response Trust Fund and IC 13-24-1 also permit IDEM to enter into agreed orders (AO) with responsible parties involved in releases of petroleum or hazardous substances.

This chapter discusses the process for cleaning up sites under the SCP. More information about the SCP is available from the IDEM web page at http://www.state.in.us/idem/olq/programs/statecleanup or by calling (317) 234-0361.

5.1 Indiana Scoring Model

Sites qualify for the SCP through the use of a scoring model known as the Indiana Scoring Model (ISM). The ISM provides a regulatory mechanism for IDEM to address hazardous substance response sites that do not qualify for the National Priorities List (NPL). The ISM serves as the IDEM Commissioner's management tool for prioritizing sites that pose the most threat to human health and the environment and for ensuring that IDEM's resources are allocated accordingly.

The ISM combines three numeric scores assigned to a hazardous substance response site based on the potential for harm to human health or the environment from (1) the migration of a hazardous substance away from the site through ground water, surface water, or air; (2) substances that can explode or cause fires; and (3) direc contact with a hazardous substance at the site. Site scoring is a dynamic process, and scores are subject to change based on significan changes in site circumstances, receipt of additional information, or other relevant factors. The final score ranges from 1 to 100, with 100 being the highest. Sites scoring less than 10 are selected for remediation as resources allow.

5.2 Indiana Commissioner's Bulletin

Once a site has been scored, it is placed on the IDE Commissioner's Bulleti , which helps management determine which sites will be addressed. The Commissioner's Bulletin also ensures that State resources are allocated properly.

The Commissioner's Bulletin is published annually as a nonrule policy in the Indiana Register. The bulletin lists names of the sites along with the most recently available score assigned to each site. The bulletin also informs the public of the location of information used to determine the score for each site and how that information can be obtained. An introduction to the bulletin provides an explanation of the general meaning of the composite scores. A copy of the bulletin and the most recent available scores is mailed to the county health officer and to the county commissioners, town boards, and mayors, as applicable.

5.3 Agreed Order

Once a site is chosen from the Commissioner's Bulletin for remediation, most parties enter into an AO. The AO is a legal and binding document that states the findings of facts, the names o responsible parties, and a statement of the work that needs to be

performed. Under certain conditions, IDEM may conduct immediate removal actions without owner or operator consent.

5.4 Site Investigation and Remediation

RISC provides a model for investigating and remediating SCP sites. All itemized reports and reporting requirements discussed in Appendix 1 are required to document SCP-related activities. Any presampling activities and optional screening data results should be incorporated into the investigation report. In addition, investigati and remediation of petroleum sites must be performed in accordance with the Petroleum Guidance provided in Appendix 4.

5.5 Community Relations Plan

Public participation and involvement is a critical component of a successful remedial action. It is the responsibility of the State to keep the public informed as well as allow for community input in the decision-making process with regard to SCP sites. The SCP follows the NCP's guidance for community relations plans (CRP). The NCP guidelines for the CRP design, implementation, and structure ar presented in the NCP at 300.430(c) through 300.435(c).

The CRP guidance requires the State to conduct community interviews, prepare a formal CRP, and establish a local information repository. It also requires the State to publish a notice of availability and brief analysis of the proposed remediation plan, make the proposed plan available in the administrative record (AR) for the site, and provide a public comment period on the proposed plan. The State is also responsible for the following:

- Providing an opportunity for a public meeting
- Keeping a transcript of the public meeting
- Preparing a written summary of significant comments received during the public meeting, along with the State's responses
- Making the summary available in the record of decision (ROD) for the site

5.6 Information Repository

The CRP requires the establishment of an information repositor located close to the SCP site location (usually the local library). The State maintains the information repository by adding key documents as they become available. The purpose of the information repository is to allow interested parties and concerned citizens the opportunity to review site documents at a convenient location.

5.7 Record of Decision

The ROD, which serves as the official decision document for a site's remedy selection, summarizes problems posed by the site, alternative remedies considered for addressing these problems, and an analysis of the alternatives. The ROD then identifies the selected remedy and provides the rationale for the selection.

The ROD serves three purposes. First, it describes the technica parameters and goals of the selected remedy. Second, it is a lega document that certifies that the remedy was selected in accordance with CERCLA and NCP requirements. Third, the ROD is a public document that provides a single comprehensive source of information about the site and the remedy. Guidance on ROD preparation is presented in *A Guide to Developing Superfund Records of Decision* (9335.3-02FS-1), May 1990.

5.8 Administrative Record

During site evaluation and remediation in the SCP process, the State is responsible for maintaining an AR. The AR consists of key decisio documents and a complete record of site-related activities. The AR provides legal documentation of site-related activities.

5.9 Split Sampling

The State maintains the option to split samples whenever necessary. Split sampling is performed at the discretion of the SCP project manager. Split samples can consist of soil, sediment, ground water, or other environmental media. During a split sampling event, the projec manager will collect samples from the same locations and at the same time as the responsible parties. The samples will be analyzed using the same methodologies at different laboratories to determine if analytical results are comparable.

5.10 Natural Resources Damage Assessment

Natural resources are defined in IC 13-11-2-137 as land, fish, wildlife, biota, air, water, ground water, drinking water supplies, and other resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the State. CERCLA and the Oil Pollution Act (OPA), 33 USC 2701-2761, establish liability for damages associated with the loss or injury of natural resources caused by releases of hazardous substances or oil. CERCLA and OPA require the designation of certain federal and State officials to act on behalf of the public as trustees for natural resources.

The natural resource trustees designated for the State of Indiana include appointed representatives from IDEM, the Indiana Department of Natural Resources (DNR), the U.S. Department of Interior (DOI), and the U.S. Department of Commerce (DOC). The U.S. Fish and Wildlife Service (FWS) is designated to act on behalf of the DOI, and the National Oceanic and Atmospheric Agency (NOAA) is designated to act on behalf of the DOC. The trustees are responsible for seeking compensation for natural resource injuries and utilizing compensator funds for restoring, rehabilitating, replacing, or acquiring equivalen natural resources and any lost services.

A natural resource damage assessment (NRDA) assesses damages to natural resources from releases of hazardous substances or petroleum. The NRDA is used to pursue the recovery of damages and to allocate monies recovered for restoring, replacing, or acquiring equivalen natural resources. CERCLA and the NCP provide for promp notification of and coordination with the trustees to ensure that remedial actions are selected that protect natural resources.

5.11 Site Closure

The goal of all remedial actions is to achieve closure. Closure can be achieved with or without institutional controls. RISC gives parties the flexibility to select the type of remedy that best achieves closure goals. In some cases, a party may choose to both remove the contaminan source in subsurface soil and restrict exposure to affected ground water. IDEM can invalidate closure upon discovery of new information that indicates a potential threat to human health or the environment.

RISC provides closure criteria for SCP sites. Site closure is explained in detail in the RISC Technical Guide.

5.12 Remediation of Emergency Response Sites

The Emergency Response Section was established to provide a mechanism for dealing with spills and other environmenta emergencies. 327 IAC 2-6.1 requires that the spilled material be removed or neutralized. To meet the intent of the rule and promote efficient spill response, released material must be immediately removed to background levels or nondetectable concentrations "to most effectively prevent a spill from entering waters of the state."

5.12.1 Applicability

In 1998, it was recognized that a mechanism was needed to address long-term remediation needs at emergency response sites where spill responses failed to remove contaminant concentrations to background or nondetect levels. In these cases, the site may be turned over to the SCP. Under the SCP, the site becomes a "remedial response site." Remedial response sites usually are not required to conform to all of the administrative requirements of the SCP. When the site is in a remedial response stage, the SCP may use RISC to close the site.

Emergency remedial response sites also fall under the same lega authority as other sites involved in the SCP: Indiana's Hazardous Substances Response Trust Fund, IC 13-25-4, and Petroleum Releases, IC 13-24-1. Petroleum-contaminated emergency response sites forwarded to the SCP as remedial response sites may also fall under the legal authority of the Leaking Underground Storage Tank (LUST) Program. Chapter 3 of this RISC User's Guide provides LUST guidance and discusses applicable LUST legislation.

5.12.2 Process

Emergency remedial response sites referred to the SCP are logged into the State cleanup database, and a project manager determines whether it should remain in the SCP or be referred to the LUST Program. site is referred to the LUST Program if contamination results from a release from an underground storage tank (UST) that held petroleum product after January 1, 1974. If all product was removed from the tank before Januar 1, 1974, the site should remain in the SCP for the duration of remedial activities. All other sites not involving USTs should remain in the SCP during remediation. Releases from unregulated USTs are usually remediated in accordance with the LUST guidance procedures described in Chapter 3 and Appendix 3 of this RISC User's Guide.

For sites retained under the SCP, a letter requesting an initial spill report is sent to the responsible party. IDEM technical staff then review the report and recommend further actions. IDEM may reques further site investigation to determine the extent of contamination. The next step depends on the extent of contamination and the contaminant(s). The LUST guidance in Chapter 3 can be used to establish cleanup criteria for petroleum-contaminated sites. In some cases, the site may be recommended for remediation under the Voluntary Remediation Program (VRP) (see Chapter 4) or scored using the ISM for possible inclusion in the Commissioner's Bulletin. If a site is not scored using the ISM, it may be possible to apply for a no further action (NFA) letter. Requests for NFA letters are processed and evaluated on a site-by-site basis.

5.13 Cleanup Guidance

Cleanup guidances for each type of site that may interact with the SCP are summarized in Table 5-1 below. Chapter 5 of the Technical Guide contains guidance on determining which constituents to consider at a site.

Table 5-1. Cleanup Guidance

Type of Site	Cleanup Guidance
SCP	Based on RISC Technical Guide
Remedial Response	Based on RISC Technical Guide
LUST	Based on Chapter 3 and Appendix 3 of this RISC User's Guide and the RISC Technical Guide
Petroleu	Based on Chapter 3 and Appendix 4 of this RISC User's Guide and the RISC Technical Guide
VRP	Based on Chapter 4 of this RISC User's Guide and the RISC Technical Guide

Appendix 1 General Report Outline Formats

Overview of Appendix 1

- ✧ Introduction
- ✧ Investigation Report
- ✧ Remediation Work Plan
- ✧ Remediatio
- ✧ Progress Report
- ✧ Closure Report

A1.0 Introduction

This appendix provides general report outline format to follow when submitting information to the Office of Land Quality (OLQ) under the Voluntary Remediation Program (VRP), Leaking Underground Storage Tank (LUST) Program, and State Cleanup Program (SCP). The purpose of the outline formats is to standardize and make information submitted to IDEM consistent. Program-specific chapters in the User's Guide discuss specific report additions and exclusions.

For the Brownfields Program, the investigation report outline in Appendix 1.1 should be used as a template for conducting Brownfield Environmental Assessments. All site assessment procedures in RISC are recommended but are not necessarily required for brownfield sites.

All sampling and analysis procedures should be performed in accordance with the data quality objectives (DQO) discussed in Appendix 6 of the RISC Technical Guide. Routine reports and documents must comply with all documentation requirement specified in the RISC Technical Guide except with respect to raw data. Applicable quality assurance/quality control (QA/QC) documentati should be retained for all analytical work performed throughout the project, including raw data, chromatograms, recorder outputs, mass spectra, computer printouts, charts, graphs, bench sheets, and any other hard copies generated during sampling and analysis. This documentation must be available upon request

Upon project completion, final confirmation sampling data must include all QA/QC documentation, including raw data. It is critical that sampling, sample screening, sample analytical methods, and analytical validation be performed in accordance with acceptable methods, such as SW-846, the Contract Laboratory Program (CLP) Statements of Work (SOW), and U.S. Environmental Protection Agency (U.S. EPA) national functional guidelines for the CLP. The data must be appropriate for the type of determination being made to evaluate the site. Chemicals of concern, media, and matrices should be taken into account before appropriate analytical methods are chosen to meet the DQOs. This information is also required for site characterization, health risk assessment, site remediation, legal requirements, RCRA and various remediation closures, and other relevant environmental investigations. If the required information is not available, resampling and re-analysis may be required.

Digital data submissions are requested for all sampling and monitoring information. Guidelines for digital data submission will be posted on the IDEM web page at http://www.state.in.us/idem/index.html.

Investigation Report Overview

- Introduction
- Site Background and Baseline Project Assessment
- Statement of Work
- Project Investigation
- Investigation Results
- Conclusions and Recommendations
- Referenced
- Appendices

A1.1 Investigation Report

This report outline format can be used for preparing both investigation reports and investigation work plans. Investigation work plans are applicable to projects where OLQ remediation program oversight is either required or desired. An investigation must be conducted for all areas of concern (suspected or confirmed areas of soil or ground water contamination), as required by each program. The investigation work plan is generally prepared **prior** to any field activities and describes the investigation to be undertaken.

The goal of the investigation report is to fully define the vertical and horizontal nature and extent of contamination based on land use-specific closure values. The vertical and horizontal extent of ground water contamination must be evaluated based on residential default closure levels or estimated quantitation limits (EQLs). If RISC default surface soil, subsurface soil, and ground water investigative procedures are followed, contaminant source size determinations and minimum definitive sample numbers must comply with the requirements in Chapter 4 of the RISC Technical Guide. Chapters o the User's Guide discuss in more detail program-specific reporting deadlines and further guidance. Reporting requirements may differ slightly among programs. The information requested below is essential to understanding existing site conditions and developing an acceptable remediation plan.

All information requested or required by the State must be submitted by the reporting deadlines specified by each program. Although different programs may call reports by different names or have slightly different reporting requirements, the basic information outlined below for the investigation report is the same for all programs. Specific requirements for applicable program areas must also be followed. The investigation report should be submitted in the format presented below and in conformance with program-specific requirements.

I. Introduction

A. Project Identification

1. Site name, facility identification number(s), mailing address, and telephone number
2. Site location clearly marked on appropriate U.S. Geological Survey 1:24,000 scale topographic quadrangle map
3. Current owner and operator, mailing address, and

telephone number

4. Site contact person or group responsible for the investigation

B. Overview of Current Contamination Conditions

1. Date the spill, release, or other contamination occurred or was discovered
2. How the spill, release, or other contamination was discovered
3. Remediation or product recovery measures already taken, including the following:
   a. Volume of product recovered
   b. Name of product recovered
4. Suspected source(s) of the spill, release, or other contamination
5. Estimated volume(s) of the spill, release, or other contamination
6. Approximate area impacted
7. Date the incident was reported to IDEM and resulting incident number (if assigned)
8. Existing deed restrictions, land-use restrictions, or environmental notice limitations

II. Site Background and Baseline Project Assessment

A. Site History

1. Type of facility, including description of past and current operations
2. Hazardous materials used or stored on site
3. Site ownership and operational history
4. Site spill, release, and contamination histor
5. Previously completed investigations, including the following:
   a. Reasons for previously completed investigations
   b. Current status of site conditions that prompted or initiated previously completed investigations
6. Potential chemical(s) of concern

B. Geographic Information

1. Political geographic data
   a. County name(s)
   b. Political township name(s)
   c. Section (1/4,1/4,1/4), township, and range locations

d. Universal Transverse Mercator (UTM) coordinates

2. Physical geographic data
   a. Topography and surface water flow and drainage patterns
   b. Nearby surface waters (including wetlands and surface drainageways)
   c. Nearby floodways and flood plains

C. Geologic Information

1. Surficial and unconsolidated geolog
   a. Surface soil descriptions from U.S. Department of Agriculture (USDA) Soil Conservation Service (SCS)
   b. Type(s) of unconsolidated materia
   c. Thickness of unconsolidated material
2. Bedrock geology
   a. Depth to bedrock
   b. Type of bedrock
   c. Description of primary and secondary structural features, such as fractures, jointings, and solution cavities, that could impact contaminan migration and remediation efforts
   d. Current status or future potential of aquifer underlying site as primary source aquifer
3. Hydrogeology
   a. Identification of regional aquifer(s)
   b. Identification, location, and copies of the Indiana Department of Natural Resources-Division Of Water (IDNR-DOW) well records for all municipal water supply wells and other high- capacity (greater than 70-gallon per minute [gpm] yield) wells within a 2-mile radius of the site
   c. Identification, location, and copies of IDNR-DOW records for low-volume (less than 70-gp yield) wells within a 1-mile radius of the site
   d. Regional depth to ground water and seasonal fluctuations
   e. Regional ground water flow direction(s) and gradient(s)
   f. Summary of existing site-specific data
   g. Other information, as necessary or appropriate

D. Ecologic Information

1. Potentially affected species of flora and fauna
2. Potentially affected species of flora and fauna on the Endangered Species List as published by the U.S. Fish and Wildlife Service and IDNR
3. Potential or observed effects of contamination on vegetation or wildlife populations

E. Preliminary Evaluation of Potentially Susceptible Areas

1. Drinking water source and wellhead protection areas
2. Geologically susceptible areas, such as surface water bodies, karst bedrock areas, and other areas
3. Socially susceptible areas, such as schools, parks, and hospitals
4. Ecologically susceptible areas that include habitats o concern, such as wetlands, caves, and parklands

F. Preliminary Evaluation of Possible Chemicals of Concern

1. Listed or actual chemical(s) of concern, including those with a Hazards Category, those listed on Material Safety Data Sheets (MSDS), and others
2. Suspected chemical(s) of concern based on sit operational history
3. Description of hazards categories presen
4. Copies of all MSDSs

G. Preliminary Evaluation of Potential Contaminant Transport Mechanisms

1. Discussion of surface water runoff (nonpoin mechanism)
2. Transport mechanisms to surface water, such as drainage ditches, storm sewers, and underground utility trenches
3. Discussion of ground water flow
4. Transport mechanisms to ground water, such as well bores, sewers, underground utility trenches, and karst features
5. Other transport mechanisms, such as windblown particulates and physical tracking of soil by people, animals, or machinery

H. Preliminary Evaluation of Potential Human Exposure Pathways

1. Inhalation exposure pathway
2. Ingestion exposure pathway
3. Dermal absorption exposure pathway

I. Preliminary Evaluation of Potential Ecological Exposure Pathway

1. Potential impacts to aquatic life
2. Potential impacts to wildlife and vegetation

J. Identification of Existing Data Gaps that Must Be Addressed in the Site Investigation(s)

1. Site-specific geologic information
2. Site-specific hydrogeologic information
3. Site-specific ecologic information

K. Supporting Documentation

Full bibliographic information must be provided in the references for all documents used, referenced, and cited.

1. Previous applicable reports prepared for the site or the projec
2. Available data and other applicable documentation regarding either the site or the projec
3. Conceptual site model(s)

L. Maps and Figures

All maps, figures, drawings, cross-sections, aerial photographs, and other such information must be submitted in Appendix B of the investigation report or work plan. The maps, drawings, and other items must include suitable scales, compass directions, and clearl illustrated legends. Figures must also be provided for sites where the current conditions do not accurately reflect conditions that existed at the time of the spill or release because of building renovations, underground storage tank (UST) system upgrades, and other changes. All maps and information on the maps must be legible and reproducible. Maps and figures should provide the information listed below.

1. Site location clearly on indicated U.S. Geological Survey 7.5-minute topographic quadrangle map(s)

2. Current as well as past locations of physical features o the site, including the following:
   a. Property lines
   b. Building outlines
   c. Sidewalks
   d. Buildings with basements
   e. Underground and overhead utility lines
   f. Raw materials and bulk storage areas
   g. Aboveground storage tanks
   h. USTs
   i. Tank piping trenches and associated dispenser islands
   j. Roads
   k. Pump island piping
   l. Property access points
   m. Gates and fences
   n. Loading and unloading areas
   o. On-site waste storage, treatment, and disposal areas
   p. Surface water bodies
   q. On-site ground water supply wells
3. Named facilities, property lines, property uses, curren land-use status (such as agricultural, industrial, or commercial), ground water wells, surface water, and other environmentally sensitive areas within a 1-mile radius of the site
4. Locations and identification numbers for all municipal water supply wells and high-capacity (greater than 70-gpm yield) water wells identified in IDNR-DOW well records within a 2-mile radius of the site
5. Locations and identification numbers for all low-volume (less than 70-gpm yield) wells within a 1-mile radius of the site
6. Areas where past spills or releases have occurred, where remediation efforts are currently being conducted, or where remediation efforts have been conducted in the past
7. Soil boring and monitoring well locations
8. Horizontal extent of contaminant migrati
9. Sampling locations, including sampling depths and analytical results
10. Potentiometric surfaces for all ground water monitoring events
11. Geologic and hydrologic cross sections that define the stratigraphy, vertical extent of contaminant migration, water table, and location of free product plume, i

present

12. Environmentally sensitive areas

III. Statement of Work

This section is applicable to the investigation work plan only. Those preparing investigation reports should skip to Section V .

A. Investigation Objectives

1. Describe area(s) to be investigated.
2. State the objectives of the investigation for each area.
3. Explain how the site investigation will be conducted and the objectives met for
   a. Directed investigation that focuses on known or potential sources and
   b. Undirected, sitewide investigation (when no historical or other information is available).
4. Provide the name, address, telephone number, and qualifications of the company performing the investigation work.
   a. Provide the name, address, telephone number, and qualifications of that company's contac person in charge of the investigation.
   b. Provide the name, address, telephone number, and qualifications of each subcontractor (such as a drilling firm or an analytical laboratory).
   c. Provide the certifications of drillers, geologists, engineers, and other professional staff.

B. Investigation Schedule

1. State when the investigation report will be submitted to IDEM for review and evaluation. Submittal must fall within the time constraints imposed by the appropriate program area requirements, and the submittal must be complete and include all information and data required by the appropriate program area.
2. Provide an investigation schedule that defines expected milestones, including the following:
   a. Mobilization of field crews and equipment,
   b. Completion of all field work, and
   c. Completion of all laboratory work.
3. Provide a projected date for submittal of the completed investigation report

IV. Project Investigation

This section is applicable to the investigation work plan only. Those preparing investigation reports should skip to Section V.

IDEM recognizes the benefits of various field techniques available t assist in defining the source area and the nature and extent of site contamination. These field techniques include blind drilling, test pit or trench excavation, electronic cone penetrating tests, and geophysical methods. Although such techniques can be used to augment or direct the placement of split-spoon soil borings and the installation of permanent ground water monitoring wells, IDEM does not recognize the results of these investigative techniques for final site confirmation. A sufficient number of soil and ground water samples must be analyzed by a laboratory to determine the full extent of contamination. Boring locations and sampling procedures should be conducted following the recommendations in Chapters 3, 4, 6 and 7 of the RISC Technical Guide.

A. Subsurface Geology Investigation

The subsurface geology investigation is conducted concurrently with the hydrogeology investigation. Subsurface geology conditions must be determined to adequately define the nature and extent of contaminant migration away from the source area and to develop a remediation plan.

1. Soil borings or push probe sample points may be placed as needed to define the vertical and horizontal extent of soil contamination. Locations must be accurately field surveyed with a horizontal closure of less than 1-foot error and accurately depicted on a scaled map of the site.
2. Physical descriptions for all soil samples must be provided and maintained in individual boring or probe logs by an Indiana licensed professional geologist. All boring or probe logs must use the same vertical scale, include a relative surface elevation, and be submitted in a complete and reproducible form. The following are also required:

a. Continuous sampling from the top to the botto of the hole
b. Lithologic descriptions or USDA soil textures, degree of sorting, Munsell soil colors, locations of all sedimentary contacts, gas or vapor readings, moisture content, ground water remarks, visual indications of contamination, and other relevant information
c. Any other pertinent information should be amended, as necessary, to describe subsurface site conditions
d. Well driller's certification

B. Hydrogeology Investigation

As previously noted, the hydrogeology investigation is conducted concurrently with the subsurface geology investigation. Hydrogeologic conditions must be determined to adequately define the nature and extent of contaminan migration away from the source area. Because this information will be used during remediation design and development, remediation progress monitoring, and post-remediation monitoring, the ground water monitoring well network must be adequately designed during this stage of the investigation. Section 4.4.2 of the RISC Technical Guide provides further recommendations regarding ground water investigations.

1. An adequate number of ground water monitoring wells, piezometers, or direct-push sampling points must be installed to adequately define the hydrology and exten of ground water contamination. Soil boring and direct-push sampling point locations can be used for well, piezometer, and ground water sampling locations. The location, sampling, and reporting requirements are the same as those outlined above for the subsurface geolog investigation. The requirements below also apply.
   a. Locations must be accurately depicted on a scaled map of the site.
   b. Locations must be accurately field surveyed with a horizontal closure of less than 1-foot error and a vertical closure no greater than 0.01-foot error.
2. A complete boring log must be provided for each monitoring well as discussed above for the subsurface geology investigation. For nested wells, only the deepest well should be logged.

3. Ground water monitoring well installation, construction, and development procedures must follow the standards outlined in Indiana Rule, Title 310 of the *Indiana Administrative Code* (IAC) 16-8-3(a) through (m) (which is to be superseded by 312 IAC 13).
4. Depending on their intended purpose, ground water monitoring wells must adhere to specific size requirements outlined in Indiana Rule 310 IAC 16-8-3(b) (to be superseded by 312 IAC 13).
   a. Ground water wells used to monitor water quality must be at least 2 inches in diameter.
   b. Piezometers used to monitor water levels mus be at least 0.75 inch in diameter.
   c. Sampling points resulting from the use of direct-push technologies can be used for preliminary screening purposes and for obtaining ground water grab samples to define the extent of ground water contamination. However, results from such screening and sampling are not valid substitutions for results obtained from sampling standard ground water monitoring wells.
5. The depth and interval of each well screen must be carefully planned to fulfill the intended purpose of the monitoring well and to obtain results for the chemicals of concern. When light nonaqueous-phase liquids (LNAPL) are involved, the guidelines below also apply.
   a. For unconfined aquifer conditions, the well screen must straddle the interface between the nonsaturated and saturated zones and must be of sufficient length to account for seasona fluctuations in ground water level
   b. For confined aquifer conditions, the well screen must be placed within only one water-producing horizon and must be of sufficient length to adequately monitor the entire thickness of the water-producing horizon. When dense nonaqueous-phase liquids (DNAPL) are involved, the screened intervals must be placed at the bottom of the monitored water-bearing zone(s).
6. Legible and reproducible construction logs with the same vertical scale must be submitted for each ground water monitoring well. Each construction log mus include, but not necessarily be limited to, the following information:

a. Identification and location details as outlined above for the subsurface geology investigation
b. Surface, top-of-casing, and bottom-of-casing elevations relative to all other elevations generated for the site
c. Stratigraphic horizons and depth intervals
d. Size and type of the monitoring well casing
e. Slot size of well screen
f. Depth and length of well screen
g. Type of backfill materials used in each interva
h. Well development description and records

New ground water monitoring wells must not be sampled until at least 24 hours after installation and development are complete.

7. Initial and all subsequent sampling methodologies must be established and clearly stated. Sampling methods must follow the standards and guidelines established b the appropriate program area, and sampling frequency and reporting requirements must be defined.
8. Hydrologic data from initial and subsequent regularly scheduled monitoring events should include, but not necessarily be limited to, the following information:
   a. If present, the depth to and thickness of product
   b. Depth to water, including a corrected depth to water if free product is presen
   c. Sounding to the bottom of each monitoring well casing
   d. Field screening parameters, such as turbidity, dissolved oxygen, oxidation-reduction potential, temperature, and pH
9. Depending on the site-specific geologic, hydrogeologic, and monitoring well conditions, standard purging, micropurging, or nonpurging methods can be used to obtain representative samples from the aquifer. Standard purging must be guided by field screening parameters, and screening results must be recorded.

   Micropurging of each monitoring well must designed on an individual basis. IDEM has a web site that provides guidance on micro purging at: http://www.state.in.us/idem/olq/publications/papers/index.html
   Micropurging can be used if the chemicals of concern are metals, DNAPLs, or hydrocarbons. The requirements below also apply to micropurging.
   a. An in-well pump must be used.

b. Purging must be conducted at a very low pumping rates of 0.1 to 1.0 liter per minute (L/min).
c. Purging must continue until field screening parameters exhibit steady-state conditions.
d. Screening results must be recorded.

Nonpurge sampling can be used if chemicals of concer are limited to hydrocarbons; benzene, toluene, ethylbenzene, and xylene (BTEX); and methyl tertiary butyl ether (MTBE). Nonpurge sampling cannot be used when the chemicals of concern are metals, DNAPL, or other pollutants. The requirements below also apply to nonpurge sampling.

a. Ground water is present in an unconfined aquifer.
b. Free product or a visible sheen is not present.
c. Dedicated sampling equipment is not stored within the well.
d. The water level at the time of sampling is not above the top of the screened interval.
e. Final confirmation sampling for site closure includes results from both purge and nonpurge methods for each well.

10. One ground water sample from each monitoring well must be collected and maintained for shipment to a qualified laboratory for analyses. The investigation report should provide the following information:
    a. Type of purging, sampling, sampling equipment, sample containers, and preservation techniques
    b. Analytical methods, which must be appropriate for the chemicals involved
    c. Sampling documentation and chain-of-custody record requirements, which should be maintained and submitted for IDEM review and evaluation
11. The sampling methodology and procedures must be detailed in the sampling section of each corrective action plan and progress report.

A. Ecological Evaluation of Susceptible Areas

Chapter 5 of the RISC Technical Guide discusses ecologica evaluation of susceptible areas. The investigation report shoul include, as appropriate, the following information:

1. Potentially affected endangered species
2. Environmentally sensitive areas or habitats of concern, such as surface waters, riparian areas, wetlands, and flood plains
3. Aquatic and riparian species present near the site, including potential exposure of aquatic and riparian species to site-related chemicals of concern and observed impacts to surface water quality and aquatic and riparian species
4. Area wildlife and vegetation
5. Potential wildlife and vegetation exposure pathways, including observed impacts on wildlife or vegetation

D. Background Concentration Assessment

Background concentrations are useful as a basis for determining the nature and extent of soil and ground water contamination. In some site- and program-specific cases, background concentrations are used to determine final cleanup levels. Section 3.3.4.1 of the RISC Technical Guide recommends procedures for background sampling. Background sampling procedures must be conducted in accordance with the quality assurance project plan (QAPP). Chapter 3 of the RISC Technical Guide discusses QAPP requirements. The investigation report should include the following information with regard to background sampling:

1. Background investigation analytical methods
2. Methods used to collect background data (for example, sampling of soil borings or monitoring wells or reviews of existing data or literature)
3. Background sampling locations map
4. Background data in tabular form, including media, parameters, concentrations, and sampling depths and dates
5. Statistical evaluation of background results

V. Investigation Results

This section is applicable to the investigation report only. Those preparing investigation work plans should skip to Section VII.

The site investigation report should include the results of the subsurface geology and hydrogeology investigations and of laborator analyses performed on collected samples. The results must be consistent with guidelines of the appropriate program area and be accurate and complete because the results will be used to interpret site

geology, hydrogeology, and the nature and extent of contaminan migration. Ultimately, the results will be used to develop conclusions and remediation recommendations. Tables, figures, and maps should be used whenever possible to summarize data and clearly presen information or recommendations.

A. Subsurface Geology and Hydrogeology Investigation Results

1. Provide an interpretation of sitewide stratigraphy based on soil encountered during drilling operations and described in boring logs, including the following:
   a. Cross sections of the soil horizon correlated to soil and monitoring well borings
   b. Physical characteristics of soils that could result in preferred contaminant migration pathways
   c. Horizontal and vertical extent of soil contamination
2. Provide an interpretation of sitewide hydrogeology based on conditions encountered during drilling operations and groundwater monitoring events, including the following:
   a. Vadose zone depth, thickness, and seasona fluctuations in depth and thickness
   b. Horizontal and vertical extent of soil contamination in the vadose zone
   c. Type(s), depth(s) to, and thickness(es) of aquifer(s) presen
   d. Physical description of aquifer(s) present, including the following:
      - Hydraulic conductivit
      - Porosity
      - Storativity
      - Specific yield
      - Aquifer test results
   e. Ground water level measurements, including the following:
      - Ground water flow direction
      - Ground water flow gradient and velocity
      - Seasonal fluctuations in water levels and their effect on flow direction
      - Water table elevations and potentiometric surface
   f. Ground water quality in all encountered aquifers, significant zones of saturation, and permeable zones, including the following:
      - Areal extent of free product plume(s)

- Horizontal and vertical extent of dissolved ground water contamination
- Velocity of contaminant movement in ground water

B. Laboratory Analytical Result

1. Include laboratory analytical reports in Appendi x D.
2. Identify parameters detected above the action levels for the chemicals of concern.
3. Identify parameters detected below the action levels for the chemicals of concern.
4. Describe contamination in other affected media, such as sediment, surface water, and other media.

VI. Conclusions and Recommendations

This section is applicable to the investigation report only. Those preparing investigation work plans should skip to Section VII.

The investigation report must provide an overall assessment of the nature and extent of on- and off-site contamination, an initial assessment of potential risks associated with the contamination, and an assessment of any additional work required. If remediation is planned, the report should provide preliminary remediation alternatives to the extent possible. A tentative schedule for the submission of a remediation work plan must also be provided.

A. Summary of Results

1. Type(s) of chemical(s) encountered and concentrations exceeding appropriate action levels, including the following:
   a. Tabulated field screening result
   b. Table(s) of analytical methods, sample containers, and preservation procedures for each sample matrix and sampling location (see Section VIII.)
   c. Table(s) presenting analytical results for all media where parameters exceeded method detection levels (see Section VIII.)
2. Type(s) of media impacted
3. Horizontal and vertical extent of contaminant migration, including the following:
   a. Tabulated water level measurements
   b. Geologic and hydrogeologic cross sections

c. Site soil stratigraphy identification

4. Data gaps

B. Summary of Potential Risks Associated with Site

1. Both long- and short-term human, ecological, and environmental risks
2. Possible human, ecological, and environmenta receptors
3. Current and future land-use issues, if applicable

C. Preliminary Remediation Alternatives

Feasibility studies must be taken into account when recommending remediation alternatives. The following requirements also apply to the discussion of each alternative:

1. Evaluation of overall effectiveness
2. Ability to achieve cleanup criteria
3. Expected treatment duration
4. Demonstrated treatment reliability
5. Permits required
6. Cost and time requirements

D. Recommended Remediation Method

1. Chosen remediation method
2. Schedule for submitting complete remediation work plan

VII. References

References used to prepare the investigation report or work plan or cited should be listed. Information should include author, full title, publisher, company, date, and other relevant publication information.

VIII. Appendices

A. Tables (as applicable)

1. Field screening results
2. Analytical methods, sample containers, and preservation methods
3. Analytical results from all media for parameters exceeding the method detection limit
4. Tabulated water level measurements

B. Maps and Figures

Section II.L presents detailed guidance on preparing maps and figures.

C. Site-Specific QAPP

A QAPP is required for the investigation report only. QAPPs need not be prepared for investigation work plans. The QAPP should contain all elements discussed in Chapters 3 and 4 of the RISC Technica Guide.

D. Laboratory Analytical Result

Guidelines for submitting laboratory analytical results for the investigation report are presented in Section V.B.

A1.2 Remediation Work Plan

Remediation Work Plan Overview

- Introduction
- Investigation Activities
- Remediation Plan
- References
- Appendices

IDEM will evaluate the proposed remedy for each site. Information required to evaluate a selected remedy's effectiveness must be provided in the remediation work plan to demonstrate that it is the most effective remedy for the site. The remediation work plan must provide a complete description of the selected remedy, including the following:

- Discussion of the proposed extent of remediati
- Anticipated volume of contaminated material
- Proposed treatment system
- Transportation distances for removed contaminated media
- Selection of remedial alternatives
- Treatability study reports
- Design and equipment specifications
- Permit application and disposal approvals
- Monitoring and confirmation sampling result
- Progress reports
- Equipment certification
- Operation and maintenance (O&M) plan
- Community relations activities
- Schedule of the remedial activities planned
- Other pertinent information

Specific requirements are discussed below.

I. Introduction

Information provided in the introduction can simply summarize pertinent information provided in the investigation report. Additional information collected after the last investigation report was prepared must also be included in this section.

A. Project Background

1. Site name, address, and telephone number
2. Current owner identification and address information
3. Historical summary of site ownership
4. Type of facility, including description of past and current operations
5. Site contact person or group responsible for guiding the investigation project
6. Overview of initial discovery of contamination, spill history, and previous investigations conducted at the site

B. Supporting Documentation

1. Discussion of relevant previous reports
2. Description of available data and other applicable documentation regarding the site or project

C. Remedial Action Objectives

1. Remediation and cleanup objectives for all affected media, contaminants, and exposure pathways
2. Work items planned for the remediation

II. Investigation Activities

A. Summary of Information Used to Select Remedy

The remediation work plan should summarize all information used to develop conclusions and recommendations regarding the most appropriate remedy. This information should be a synopsis of results, conclusions, and recommendations from previously prepared documents.

1. Results of baseline assessment and literature search, including the following:
   a. Geologic and hydrologic information summary

b. Physical and political geographic information summary
c. Identification of susceptible areas (see Chapter 5 of the RISC Technical Guide)

2. Extent of the subsurface work performed during site investigation, including the following:
   a. Copies of boring logs and monitoring well construction logs
   b. Copies of maps showing boring and monitoring well locations
   c. Field screening results for all soil samples collected
   d. Sampling locations for soil samples submitted for laboratory analysis

B. Summary of Site Investigation

1. Identification of all contaminants, including the following:
   a. Chemical and physical properties
   b. Contaminant toxicological data
   c. All potential effects of residual contamination
2. Summary of site-specific geolog and hydrogeolog
3. Discussion of identified sources of contamination
4. Summary and map of full horizontal and vertical extent of contamination, including the following:
   a. Impacted environmental media, such as soil, sediment, ground water, surface water, and air
   b. Concentrations of contaminants detected in environmental media
   c. Concentration trends if historical data are available

C. Summary of Risks Associated with Site

1. Human, ecological, and environmental risks for each contaminant and impacted media, including discussion of long- and short-term risks, environmentally sensitive areas, and endangered species
2. Impact of current and future land-use issues, i applicable, including need for environmental notice and deed restrictions

D. Summary of Background Concentration Assessment

Section 3.3.4.1 of the RISC Technical Guide recommends procedures for background concentration assessment. The summary can include field and laboratory results as well as statistical methods. In addition, the following information is required:

1. Summary of site-specific waste constituents or chemicals that occur naturally in the soil for each soil horizon or appropriate interval
2. Background data in tabular forma and background sampling location map
3. Statistical comparison of background concentrations to concentrations in potentially contaminated media
4. Conclusions on the reliability of the background concentration information and its applicability in determining final cleanup values

E. Additional Field Investigation Requirement

1. Additional investigations required to effectivel complete the design or the installation of the selected remedial method
2. Reasons for additional investigation
3. Complete description of additional investigation to be completed

III. Remediation Plan

Screening of potentially applicable technologies must include the evaluation of each technology's technical feasibility, protectiveness of human health and the environment, cost, need for treatability testing, ability to achieve proposed closure criteria, and community acceptance. The evaluation of alternatives must include cost estimates for completing the remediation. Estimates must include installation, startup, O&M, performance monitoring, and all sampling and analysis costs. IDEM will use this information to estimate review and oversight costs and to evaluate remediation progress.

A. Evaluation of Remedial Alternatives

1. The remedial alternatives evaluated must by identified, and the rationale for their selection must be provided. In addition, the remediation work plan should describe parameters evaluated for each of the selected alternatives. The parameters should include, but not necessarily be limited to, the following:

a. Extent of remediation effort
b. Technical feasibility to address physical and chemical characteristics of media
c. Projected contaminant removal and treatmen rates
d. Protectiveness of human health
e. Cleanup criteria
f. Ability of each alternative to achieve cleanup criteria
g. Community acceptance
h. Anticipated volume of contaminated materials to be treated
i. Ease of technology application or implementation
j. Dimensions of major technologies and space limitations
k. Process parameters
l. Cleanup time frames
m. Transportation distances
n. O&M costs
o. Any other special considerations

2. Summarize conclusions for each of the technologies evaluated, and provide reasons each technology would or would not be appropriate.
3. Identify the need for a treatability study or pilot test. Describe the treatability study or pilot test and the reasons it is required, and provide the following information:
   a. Proposed study methodology
   b. Clear statement of treatability study or waste characterization objectives
   c. Proposed scale of the study (such as bench-scale or pilot-scale)
   d. Data requirements and proposed data evaluation
   e. Pilot plant startup and O&M
   f. Anticipated date study report will be submitted
   g. Remedial technologies to be tested and equipment required
   h. Treatability study and waste characterization, as applicable
   i. Proposed disposal arrangements for wastes generated during remediation, including approvals or other necessary documentation
   j. Installation and startup procedures, including the following:

- Data requirements and analytical methods to be used
- Pilot plant O&M requirements
- Data analysis and interpretation of results to be used
- Full-scale technology application requirements and identification of limitations and optimum operating conditions

k. Statement of intention to submit report detailing treatability study or pilot test results

l. Description of review and evaluation of the treatability study or pilot test results

m. Estimated startup time of remediation system if results indicate that the chosen technology wil work as designed

n. Alternative plans if results indicate that the chosen technology will not work as designed

B. Selected Remediation Technology

If more than one remedial alternative will be used to address different on-site areas, the remediation work plan must describe how the remediation system as a whole will work. A flow diagram, conceptua sketch, or other approach should be used to illustrate the components of the remediation system. Major equipment, such as pumps, air strippers, and in situ treatment equipment, must be indicated. The work plan should include a site map showing areas to be remediated and proposed locations of major equipment.

1. Identify which evaluated technology or combination o technologies will be implemented at the site, including the technical, economic, and social acceptance rationales for the final selection.
2. Identify the need for a risk assessment, and provide the following information:
   a. Parameters to be addressed by the risk assessmen
   b. Proposed risk assessment methodologies
   c. Potential exposure pathways
   d. Exposure assumptions
   e. Environmental fate and transport data development procedures
   f. Table that lists the parameters and calculated cleanup levels

3. Provide a detailed description of the selected technology and system setup, including the following information:
   a. Technical specifications of all equipment and processes
   b. Proposed locations of all remediation equipment on a scaled site map, including piping runs and electrical wiring where applicable
   c. State or federal permit requirements for the system
   d. Waste disposal approvals needed to implemen the system

C. Monitoring and Sampling Plan

A sampling plan must be developed to track remediation progress and eventually confirm that closure levels have been achieved. Well organized and well presented data contribute significantly to the efficient review and oversight of remediation projects. Tabular formats are preferred wherever possible. The frequency, content, and format of progress reports to be submitted to IDEM during implementation of the remediation work plan should also be discussed.

1. Provide sampling plan details (follow previously approved sampling guidelines) for the following information:
   a. Sampling and monitoring parameters
   b. Sampling and monitoring frequency
   c. Schedule for submitting results to IDEM for review and evaluation (quarterly progress reporting is minimum requirement)
2. Provide data management details, including a discussion of how the monitoring and confirmati sampling data will be documented and reported, and the proposed format for progress reports.

D. Projected Work Schedule

It is critical that the remediation work plan include a detailed schedule for implementation. The schedule will enable IDEM to coordinate implementation oversight activities and the final site inspection with the applicant. The proposed schedule should allow sufficient time for review, public notice, and approval by IDEM before work begins. The schedule should identify the following:

1. Projected installation and startup schedule
2. Sampling and monitoring schedule
3. Contaminant removal and treatment rates, including remediation progress milestones and projected completion dates
4. O&M plan, including the following information:
   a. Optimum operating conditions
   b. Necessary O&M tasks, their frequency, replacement schedule, and planned O&M replacement events
   c. Proposed inspection tasks and schedule
   d. Potential problems and their remedies
   e. Contingency plan indicating how the applicant plans to respond in the event of a system failure, including the following information:
      - Description of alternate operati procedures to prevent undue hazards i the system fails
      - Notification procedures in case o system shutdown or failure
      - System modification procedures

IV. References

References used to prepare the remediation work plan or cited in the plan should be listed. Information should include author, full title, publisher, company, date, and other relevant publication information.

V. Appendices

A QAPP is required for the remediation work plan. The QAPP should contain all elements discussed in Chapters 3 and 4 of the RISC Technical Guide. If a QAPP was already submitted as part of the investigation report, it need not be resubmitted.

A1.3 Remediation Progress Report

Remediation Progress Report Overview

- ✧ Introduction
- ✧ Regularly Scheduled Monitoring and Sampling Events

At a minimum, remediation progress reports summarizing sampling and monitoring results must be submitted on a quarterly basis. Results must be recorded on the Corrective Action Progress Report form, which is presented in Appendix 3.4 of this User's Guide. At the end o the project, a final report must be filed to document that closure goals and objectives have been achieved.

I. Introduction

A. Project Identification

1. Site name, facility identification number(s), mailing address, and telephone number
2. Site location clearly marked on appropriate U.S. Geological Survey 1:24,000 scale topographic quadrangle map
3. Current owner and operator, mailing address, and telephone number
4. Site contact person or group responsible for the investigation
5. Sampling and monitoring dates

B. Brief Narrative of Remediation Process

1. Basic description of process(es) involved
2. Information about when the remediation system was started

II. Regularly Scheduled Monitoring and Sampling Events

A. Data from current and previous monitoring and sampling events

B. Graphical display of data to show remediation effectiveness and trends, including historical comparison with previous sampling results

C. Summary of O&M or downtime experienced during curren reporting period, including the following:

1. Reasons for O&M problems or downtime
2. Length of downtime
3. Corrective measures taken to repair the syste

D. Recommendations concerning need for additional monitoring and sampling events, including the following:

1. Continued monitoring and sampling if cleanup criteria have not been achieved
2. Final confirmation monitoring and sampling if cleanup criteria have been achieved, including a confirmation sampling plan for all impacted media, confirmation sampling locations, and confirmation sampling schedule

Closure Report
Overview

- Introduction
- Confirmation Sampling

A1.4 Closure Report

The primary purpose of the closure report is to document completi of activities identified in the remediation work plan (see Appendix A1.2). The report also provides information about the performance o the remediation system and indicates how the site was or will be restored following remediation.

I. Introduction

A. Project Identification and Site Background

1. Site name, facility identification number(s), address, and telephone number
2. Current owner and operator, mailing address, and telephone number
3. Site contact person or group responsible for guiding the remediation project(s)
4. Historical summary of site ownership
5. Type of facility, including description of past and current operations
6. Site location map and site layout drawing showing the following:
   a. Property boundaries, roads, loading and unloading areas, and building outlines
   b. Locations of treatment or disposal areas, remediated areas, ground water monitoring wells, ground water production wells, sampling points, and major remediation equipment
   c. Raw materials and bulk storage areas
7. Overview of the initial discovery of contamination, spill history, investigations conducted at the site, and remediation history
8. List of previously completed reports concerning the site, and a discussion of other data and documentation available for the site

B. Remediation Effort

1. Description of the remediation system, including a block flow diagram or other conceptual illustration of the system as installed and major equipment used or installed
2. Evaluation of overall system performance, including discussion of procedures used to measure and documen

system performance, significant problems tha occurred, and how the problems were addressed

3. Description of remedial action(s) undertaken at the site, including the following:
   a. Summary of remedial activities performed
   b. Description of wastes generated during remedial activities, including total volumes or amounts and final disposition
   c. Description of time required to achieve full remediation

II. Confirmation Sampling

IDEM must receive advance notice before any confirmation sampling is conducted so that the sampling activities can be observed and duplicate samples can be collected, if appropriate. IDEM will not evaluate any requests for No Further Action, final closure, Covenant Not to Sue, or other actions until the final report has been approved and confirmation monitoring and sampling have been completed.

The closure report must describe confirmation sampling procedures as they were actually implemented. The actual numbers and locations o confirmation samples must be shown on a map. Analytical results must be presented in tabular form, addressing all sampling locations, affected media, and contaminants. The name, address, and telephone number of the laboratory or (laboratories) that performed the analyses must also be identified. Copies of laboratory reports and chain-of-custody forms should be provided in Appendices A and B.

A. The confirmation monitoring portion of the closure report must include the information below.

   1. Data from most recent monitoring and sampling even
   2. Graphical display of data to show remediati effectiveness and trends, including historica comparison with previous sampling results
   3. Summary of O&M problems or downtime experienced during current reporting period, including the following:
      a. Reasons for O&M problems or downtime
      b. Length of downtime
      c. Corrective measures taken to repair the syste
   4. Recommendations concerning need for additional monitoring and sampling events, including the following:

a. Continued monitoring and sampling if cleanup criteria have not been achieved, including re-evaluation of time required to achieve cleanup criteria and revised monitoring and sampling schedule
b. Final closure report submittal if cleanup criteria have been achieved, including the following:
   - Final confirmation monitoring and sampling repor
   - Information that demonstrates that cleanup criteria have been achieved
   - Clear statement of expected future uses of the site after remediation is completed (such as residential or nonresidential)
   - Discussion of deed restrictions, land-use restrictions, or environmental notice requirements

B. Completed Field Work and Laboratory Analysis

1. Summary of confirmation sampling performed, including the following:
   a. Confirmation sampling procedures
   b. Confirmation sampling locations on a plan view map
   c. Rationales for sampling locations and number of samples collected
2. Confirmation sampling results, including the following:
   a. Tabulated or graphi al representation of result for all affected media and contaminants, including historical comparison of contaminant concentrations
   b. Laboratory reports in Appendix A, including the following:
      - List of analytical methods used and associated parameters
      - Name, address, and telephone number of laboratory
   c. All chain-of-custody forms in Appendix B

C. Evaluation of Confirmation Sampling Results

1. Comparison of confirmation sampling results with the agreed upon cleanup levels
2. Acceptable cleanup criteria for all contaminants o concern and for all affected media

3. Demonstration that acceptable cleanup criteria have been met

D. Final Site Restoration

A description of work required to restore the site after remediation is required. Issues such as monitoring wel abandonment and equipment dismantling must be addressed.

1. Summary of site restoration work, including the following:
   a. Description of how disturbed areas have been or will be restored
   b. Completion schedule for restoration activities
2. Description of remediation equipment dismantling and removal, including the following:
   a. Description of decontamination procedures
   b. Description of decontamination verification sampling
   c. Description of waste disposal activities conducted

III. Appendices

A. Copies of Laboratory Report

B. Chain-of-Custody Forms

APPENDIX 2

RCRA CLOSURE AND CORRECTIVE ACTION CERTIFICATIONS

CLOSURE PLAN CERTIFICATION STATEMENT

I certify, under penalty of law, that this document and all appendixes and attachments as applicable were prepared under my direction or supervision in accordance with a syste designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

U. S. EPA Identification No.	Facility Name
Signature of Owner or Operator	Name and Title
Date	

CLOSURE CERTIFICATION STATEMENT

The hazardous waste management unit(s) at the facility described in the closure plan has (have) been closed in accordance with the specifications in the approved closure plan. I certify under penalty of law that this document and all appendixes and attachments as applicable were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons that manage the system or of persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

U. S. EPA Identification No.	Facility Name
Signature of Owner or Operator	Name and Title
Signature of Registered P.E.	Name of P.E. and Registration No.
Date	

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

LEAKING UNDERGROUND STORAGE TANK SECTION
INITIAL INCIDENT FACSIMILE COVER SHEET
100 NORTH SENATE AVENUE
P.O. BOX 7015
INDIANAPOLIS, INDIANA 46207-7015

IF EMERGENCY CONDITIONS EXIST AT THE SITE, YOU MUST CONTACT THE 24-HOUR EMERGENCY RESPONSE NUMBER AT (317) 233-7745 TO REPORT THE RELEASE.

TO:ENVIRONMENTAL SCIENTIST III	**FAX NO.: (317) 234 -0428**
OFFICE/SECTION: OLQ/LUST	**TELEPHONE NO.: (317) 232-8900**

COMPANY NAME:	
ADDRESS:	
FROM:	**NUMBER OF PAGES: 2**
TELEPHONE NO.: ( ) -	**FAX NO.: ( ) -**

Upon receipt of your faxed form, our office will contact you within two business days. We wil provide you with an incident number and a site priority ranking. We may request further information that more accurately describes site conditions. If we do not contact you within the allotted time frame, please call our office directly. Please fill out this form completely.

THIS INCIDENT REPORT WILL BE CONSIDERED VALID WHEN YOU HAVE BEEN CONTACTED BY OUR OFFICE.

YOUR REPORT SUBMITTAL COMPLIANCE SCHEDULE BEGINS WITH THIS INITIAL NOTIFICATION.

SIGNATURE: _____

INITIAL INCIDENT REPORT
LEAKING UNDERGROUND STORAGE TANK PROGRAM
INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

LUST INCIDENT NO.: ________-_________-__________ DATE: _____/____/_____
PRIORITY RANKING: LOW MEDIUM HIGH

FACILITY NAME: ____________________________________ FACILITY I.D. NO.:_____________________
ADDRESS: ____
CITY: ______________________________ COUNTY: ____________________________ ZIP: __________

CONTACT PERSON: ______________________________ TELEPHONE NO.: ( ) - ________________

RESPONSIBLE PARTY: ____________________________ OWNER I.D. NO.: ___________________________
ADDRESS: ____
CITY: ______________________________ COUNTY: ____________________________ ZIP: __________
CONTACT PERSON: ______________________________ TELEPHONE NO.: ( ) - ________________

REPORTED BY: ___________________________________ COMPANY: ______________________________
ADDRESS: ____
CITY: ________________________________ STATE: _________________________ ZIP: ________
TELEPHONE NO.: ( ) - ______ Ext.: ________

TANK SIZE: CONTAMINANT (check one):

_____GALLONS	GAS ❑	KEROSENE ❑	JET FUEL ❑	DIESEL ❑	WASTE OIL ❑	VIRGIN OIL ❑	HZD ______
_____GALLONS	GAS ❑	KEROSENE ❑	JET FUEL ❑	DIESEL ❑	WASTE OIL ❑	VIRGIN OIL ❑	HZD ______
_____GALLONS	GAS ❑	KEROSENE ❑	JET FUEL ❑	DIESEL ❑	WASTE OIL ❑	VIRGIN OIL ❑	HZD ______
_____GALLONS	GAS ❑	KEROSENE ❑	JET FUEL ❑	DIESEL ❑	WASTE OIL ❑	VIRGIN OIL ❑	HZD ______
_____GALLONS	GAS ❑	KEROSENE ❑	JET FUEL ❑	DIESEL ❑	WASTE OIL ❑	VIRGIN OIL ❑	HZD ______

LOCATION OF RELEASE(S):
❍ TANK ❍ PIPING LINE ❍ JOINT CONNECTIONS ❍ PUMP ISLAND
❍ OTHER: ____

KNOWLEDGE OF RELEASE(S) BY:
❍ FAILED TIGHTNESS TEST ❍ INVENTORY LOSS (_____ gallons) ❍ DURING UST CLOSURE
❍ CATASTROPHIC SPILL (estimated quantity lost: ___________ gallons) ❍ LONG-TERM OVERFILL
❍ OTHER: ____

AFFECTED AREA(S):
❍ NATURAL SOIL
❍ BACKFILL (_____cubic yards) ❍ HIGHEST SAMPLE RESULT: COC _________ ______pp
❍ DOMINANT SOIL TEXTURE: ______________________ ❍ UNKNOWN
❍ GROUNDWATER
❍ WATER TABLE DEPTH (___________ feet below grade)
❍ HIGHEST LAB SAMPLE RESULT: B______ T______ E______ X______ MTBE ______ ppb

	Yes	No		Yes	No
DRINKING WATER AFFECTED	❍	❍	UTILITY LINES AFFECTED	❍	❍
GEOLOGICALLY SUSCEPTIBLE ARE	❍	❍	WELLHEAD PROTECTION ARE	❍	❍
VAPORS IN INHABITABLE BUILDING	❍	❍			
FREE PRODUCT (_________ inches/feet thick)	❍	❍			
ECOLOGICALLY SUSCEPTIBLE ARE	❍	❍			

20-DAY ABATEMENT REPORT

SITE NAME: _____ **UST FACILTY I.D. NO.** _____

CONTACT PERSON OR GROUP: _____
ADDRESS: _____
CITY: _____ **STATE:** _____ **ZIP:** _____
TELEPHONE NO.: (__) _____-_____ **Ext.:** _____

CURRENT OWNER OR OPERATOR NAME: _____
ADDRESS: _____
CITY: _____ **STATE:** _____ **ZIP:** _____
TELEPHONE NO.: (__) _____-_____ **Ext.:** _____

PAST OWNER OR OPERATOR NAME(S) (to extent practicable): _____
ADDRESS: _____
CITY: _____ **STATE:** _____ **ZIP:** _____
TELEPHONE NO.: (__) _____-_____ **Ext.:** _____

SITE INFORMATION

TYPE OF FACILITY: _____

DESCRIPTION OF PAST AND CURRENT OPERATIONS: _____

BRIEF SUMMARY OF SITE OWNERSHIP AND OPERATIONAL HISTORY _____

OVERVIEW OF INITIAL CONTAMINATION DISCOVERY: _____

SPILL HISTORY AND PREVIOUS INVESTIGATIONS: _____

TANK INFORMATION

_____ Gallons Construction Material: _____ Leak Detection: _____ Age: _____
Installation Date: _____ Past Contents: _____ Present Contents: _____

_____ Gallons Construction Material: _____ Leak Detection: _____ Age: _____
Installation Date: _____ Past Contents: _____ Present Contents: _____

ATTACH SHEET(S) AS NECESSARY. RECORDS OF MOST RECENT TIGHTNESS TEST RESULTS, INVENTORY RECORDS, AND TANK GAUGING RECORDS FOR THE PAST CALENDAR YEAR SHOULD BE ATTACHED.

FREE PRODUCT REMOVAL REPORT

SITE NAME: _____ **UST FACILTY I.D. NO.:** _____

CONTACT PERSON OR GROUP: _____

ADDRESS: _____
CITY: _____ **STATE:** _____ **ZIP:** _____
TELEPHONE NO.: (__) _____-_____ **Ext.:** _____

CURRENT OWNER OR OPERATOR NAME: _____
ADDRESS: _____
CITY: _____ **STATE:** _____ **ZIP:** _____
TELEPHONE NO.: (__) _____-_____ **Ext.:** _____

PAST OWNER OR OPERATOR NAME(S) (to extent practicable): _____
ADDRESS: _____
CITY: _____ **STATE:** _____ **ZIP:** _____
TELEPHONE NO.: (__) _____-_____ **Ext.:** _____

NAME OF PERSON RESPONSIBLE FOR PRODUCT REMOVAL: _____
ADDRESS: _____
CITY: _____ **STATE:** _____ **ZIP:** _____
TELEPHONE NO.: (__) _____-_____ **Ext.:** _____

OBSERVED PRODUCT INFORMATION

ESTIMATED QUANTITY: _____ **TYPE:** _____ **THICKNESS:** _____

DETAILED DESCRIPTIONS OF IMMEDIATE ACTIONS TAKEN TO PREVENT ANY FURTHER RELEASE: _____

MEASURES TAKEN TO PREVENT FURTHER MIGRATION: _____

ACTIONS TAKEN TO IDENTIFY AND MITIGATE FIRE AND EXPLOSION HAZARDS: _____

ACTIONS TAKEN TO INVESTIGATE FREE PRODUCT RELEASE: _____

DESCRIPTION OF FREE PRODUCT RECOVERY SYSTEM: _____

FINAL DISPOSITION OF RECOVERED FREE PRODUCT: _____

COPIES OF ALL PERMITS FROM LOCAL, STATE, AND FEDERAL AGENCIES FOR HANDLING, TREATING, DISCHARGING, AND DISPOSING OF THE FREE PRODUCT MUST BE ATTACHED.

CORRECTIVE ACTION PROGRESS REPORT

FACILITY NAME: _____ **FACILITY I.D. NO.:** _____
IDEM PROJECT MANAGER: _____ **INCIDENT NO.:** _____

CONSULTANT COMPANY: _____
CONSULTANT NAME AND SIGNATURE: _____
ADDRESS: _____
CITY: _____ **STATE:** _____ **ZIP:** _____
TELEPHONE NO.: (____) _____ - _____ **Ext.:** _____

SUBMITTAL DEADLINES (FOR OFFICE USE ONLY)

CURRENT REPORTING TYPE: ❑ **QUARTER** ❑ **FINAL**

TODAY'S DATE____/____/____

REPORTING PERIOD	DUE DATE	REPORTING PERIOD	DUE DATE
❑ January 1st-March 31st	April 30th	❑ April 1-June 30th	July 31st
❑ July 1-September 30th	October 31st	❑ October 1-December 31st	January 31st

SITE INFORMATION

CONTAMINANT(S):

❑ **GASOLINE** ❑ **VIRGIN HYDROCARBON OIL** ❑ **WASTE OIL**
❑ **HIGH-END LIQUID HYDROCARBON FUEL (KEROSENE, JET FUEL, DIESEL, ETC.)**
❑ **HAZARDOUS: CAS NO.** _____
❑ **MTBE**

SELECTED CORRECTIVE ACTION FOR: ❑ **SOIL** ❑ **GROUNDWATE**

❑ **VAPOR EXTRACTION** ❑ **LAND FARM** ❑ **PUMP AND TREAT**
❑ **AIR SPARGING** ❑ **BIOREMEDIATION** ❑ **STABILITY MONITORING**
❑ **MONITORED NATURAL ATTENUATION**
❑ **OTHER:** _____

VOLUME TREATED

	Current Quarter		Cumulative Annual Total	
Free Product	_____	gallons	_____	gallons
Groundwater	_____	gallons	_____	gallons
Soil	_____	cubic yards	_____	cubic yards
Soil to Landfill	_____	cubic yards	_____	cubic yards
Est. Vocs	_____	pounds	_____	pounds

CONTAMINATION CONCENTRATION MONITORING

Please fill in the lettered rows with the appropriate petroleum or hazardous constituent name(s). Fill in the "sample I.D." column with abbreviated monitoring well numbers (such as "MW-1") and soil boring numbers (such as "SB-1"). Please list the three highest contaminant levels only. Additional sampling information may be requested.

SOIL:

Sample I.D.	Units	A _____	B _____	C _____	D ___
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

GROUNDWATER:

Sample I.D.	Units	A _____	B _____	C _____	D ___
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

Appendix 4.1 Chemicals of Concern for Site Contaminated with Petroleum Hydrocarbons Regulated Under IC 13-11 and 329 IAC 9

Introduction

RISC identifies specific contaminants associated with petroleum hydrocarbon products. These contaminants are referred to in this appendix as chemicals of concern (COC). Petroleum hydrocarbon products are defined as virgin petroleum fuels or virgin lubrication oils. For the purpose of classifying COCs, the following categories o petroleum products are recognized: gasoline, high-end liquid hydrocarbon fuels, and hydrocarbon oils. The COCs for these categories of petroleum products are listed below. Table 4.1-1 lists the petroleum COCs and includes their default closure levels. Table 4.1-2 lists 0.25-acre source size migration to ground water closure levels. Only the migration to ground water exposure level for a 0.25-acre source has been calculated. The closure levels for other exposure routes are listed in Table 4.1-1. A different closure level can be calculated by using site-specific data in the default equations or by eliminating an exposure pathway (such as direct contact).

Gasoline

- Methyl tertiary butyl ether (MTBE)
- Benzene, toluene, ethylbenzene, and xylene (BTEX)

High-End Liquid Hydrocarbon Fuels

High-end liquid hydrocarbon fuels include diesel, No. 2 fuel oil, kerosene, aviation gasoline, and jet fuels. The COCs for this categor are BTEX and the following Class B2 carcinogenic polynuclear aromatic hydrocarbons (cPAHs):

- Benzo(a)anthracene
- Benzo(b)fluoranthene
- Benzo(k)fluoranthene
- Benzo(a)pryene
- Chrysene
- Dibenz(a,h)anthracene
- Indeno(1,2,3-cd)pyrene

Hydrocarbon Oils

Hydrocarbon oils are fuel and lubrication oils such as virgin motor oil and fuel oils No. 4, 5, and 6 (bunker oil). These oils are composed o complex petroleum hydrocarbon constituents. The COCs for this category are the cPAHs.

Table 4.1-1. Petroleum COC Default Closure Levels - Commercial / Industrial

	Soil Exposure							Ground Water				
Petroleum COC	Soil Attenuation Capacity (mg/kg)	Soil Saturation (mg/kg)	Construction Worker (mg/kg)	Direct Contact (mg/kg)	Migration to Ground Water (mg/kg)	Default (mg/kg)	Detection Limit (mg/kg)	Solubility (mg/L)	MCL (mg/L)	Commercial/ Industrial Use (mg/L)	Default (mg/L)	Detection Limit (mg/kg)
Benzo(a)anthracene	6,000/2,000		790 c	15 c	62 c	15 c	0.009	0.0094		0.0039 c	0.0039 c	0.0002
Benzene	6,000/2,000	870	120	13 c	0.67 c	0.67 c	0.005	1,800	0.005	0.099 c	0.099 c	0.005
Benzo(b)fluoranthene	6,000/2,000		790 c	15 c	74 c	15 c	0.012	0.0015		0.0039 c	0.0015 c	0.0002
Benzo(k)fluoranthene	6,000/2,000		7,900 c	150 c	39 c	39 c	0.012	0.0008		0.039 c	0.0008 c	0.0002
Benzo(a)pryene	6,000/2,000		79 c	1.5 c	16 c	1.5 c	0.016	0.0016	0.0002	0.00039 c	0.00039 c	0.0002
Chrysene	6,000/2,000		79,000 c	1,500 c	25 c	25c	0.100	0.0016		0.39 c	0.0016 c	0.0015
Dibenz(a,h)anthracene	6,000/2,000		79 c	1.5 c	60 c	1.5 c	0.020	0.0025		0.00039 c	0.00039 c	0.0002
Ethylbenzene	6,000/2,000	400	29,000	6,800	200	200	0.005	170	0.7	10	10	0.005
Indeno(1,2,3-cd)pyrene	6,000/2,000		790 c	15 c	3.1 c	3.1 c	0.030	0.000022		0.0039 c	0.000022 c	0.0002
MTBE	6,000/2,000	32,000	38,000 c	330 c	5.6 c	5.6 c	0.005	48,000		0.72 c	0.72 c	0.005
Toluene	6,000/2,000	650	11,000	2,200	240	240	0.005	530	1	20	20	0.005
Xylenes (mixed)	6,000/2,000	410	34,000	6,200	3,400	410	0.005	180	10	200	180	0.005

Notes:
c = Carcinogen
MCL = Maximimum contaminant level
mg/kg = Milligram per kilogram
mg/L = Milligram per liter

Table 4.1-1. Petroleum COC Default Closure Levels - Residential

	Soil Exposure							Ground Water				
Petroleum COC	Soil Attenuation Capacity (mg/kg)	Soil Saturation (mg/kg)	Construction Worker (mg/kg)	Direct Contact (mg/kg)	Migration to Ground Water (mg/kg)	Default (mg/kg)	Detection Limit (mg/kg)	Solubility (mg/L)	MCL (mg/L)	Residential (mg/L)	Default (mg/L)	Detection Limit (mg/kg)
Benzo(a)anthracene	6,000/2,000		790 c	5.0 c	19 c	5.0 c	0.009	0.0094		0.0012 c	0.0012 c	0.0002
Benzene	6,000/2,000	870	120	8.2 c	0.034 c	0.034 c	0.005	1,800	0.005	0.0062 c	0.005 c	0.005
Benzo(b)fluoranthene	6,000/2,000		790 c	5.0 c	57 c	5.0 c	0.012	0.0015		0.0012 c	0.0012 c	0.0002
Benzo(k)fluoranthene	6,000/2,000		7,900 c	50 c	39 c	39 c	0.012	0.0008		0.012 c	0.0008 c	0.0002
Benzo(a)pryene	6,000/2,000		79 c	0.50 c	8.2 c	0.50 c	0.016	0.0016	0.0002	0.00012 c	0.0002 c	0.0002
Chrysene	6,000/2,000		79,000 c	500 c	25 c	25 c	0.006	0.0016		0.12 c	0.0016 c	0.00015
Dibenz(a,h)anthracene	6,000/2,000		79 c	0.50 c	18 c	0.50 c	0.020	0.0025		0.00012 c	0.00012 c	0.0002
Ethylbenzene	6,000/2,000	400	29,000	4,600	13	13	0.005	170	0.70	1.6	0.70	0.0005
Indeno(1,2,3-cd)pyrene	6,000/2,000		790 c	5.0 c	3.1 c	3.1 c	0.030	0.000022		0.0012 c	0.000022 c	0.0002
MTBE	6,000/2,000	32,000	38,000 c	190 c	0.35 c	0.35 c	0.005	48,000		0.045 c	0.045 c	0.005
Toluene	6,000/2,000	650	11,000	1,700	12	12	0.005	530	1.0	0.93	1.0	0.005
Xylenes (mixed)	6,000/2,000	410	34,000	4,800	190	190	0.005	180	10	1.9	10	0.005

Notes:
c = Carcinogen
MCL = Maximum contaminant level
mg/kg = Milligram per kilogram
mg/L = Milligram per liter

Table 4.1-2. 0.25-Acre Migration to Ground Water
Risk-Based Closure Levels for Petroleum COCs

Chemical	Residential (mg/kg)	Commercial (mg/kg)	SAC (mg/kg)	Construction Worker (mg/kg)	Saturation Concentration (mg/kg)
Benzo(a)anthracene	29	93	2,000	790	
Benzene	0.05	1.0	2,000	120	870
Benzo(b)fluoranthene	86	111	2,000	790	
Benzo(k)fluoranthene	59	59	2,000	7,900	
Benzo(a)pryene	12	24	2,000	79	
Chrysene	38	38	2,000	79,000	
Dibenz(a,h)anthracene	27	90	2,000	79	
Ethylbenzene	20	300	2,000	29,000	400
Indeno(1,2,3-cd)pyrene	4.7	4.7	2,000	790	
MTB	0.53	8.4	2,000	38,000	32,000
Toluene	18	360	2,000	11,000	650
Xylenes (mixed)	290	5,100	2,000	34,000	410

Notes:

SAC = Soil attenuation capacity (fraction of organic content x 1.0E+06)

Waste Oils

Because waste oils may have an unknown variety of contaminants in them, a list of COCs cannot be developed. In specific cases, a person may propose to use the hydrocarbon oil COCs as an initial starting point.

Appendix 4.2

Default Subsurface Soil Petroleum Characterization for Sites Regulated Under IC 13-11 and 329 IAC 9

Introduction

The RISC guidance includes a specific two-step procedure for screening and determining the extent of contamination within subsurface soil at petroleum release sites. This procedure constitutes a combined approach for screening and characterizing subsurface soil. Surface soil and ground water screening may still be necessary for petroleum release sites. Procedures for screening are the same as for chemical release sites.

Borings should be performed as outlined in Chapter 3 of the RISC Technical Guide. If an unbreached, dense, and relatively low-permeability stratigraphic unit is present beneath the source area, a shallower investigation may be warranted. Highly permeable conditions may warrant a deeper investigation. For the purposes of evaluating the migration to ground water pathway, samples should not be collected from the smear zone.

Ground water screening should be conducted in accordance with the default guidance presented in Section 3.4.5 of the RISC Technical Guide.

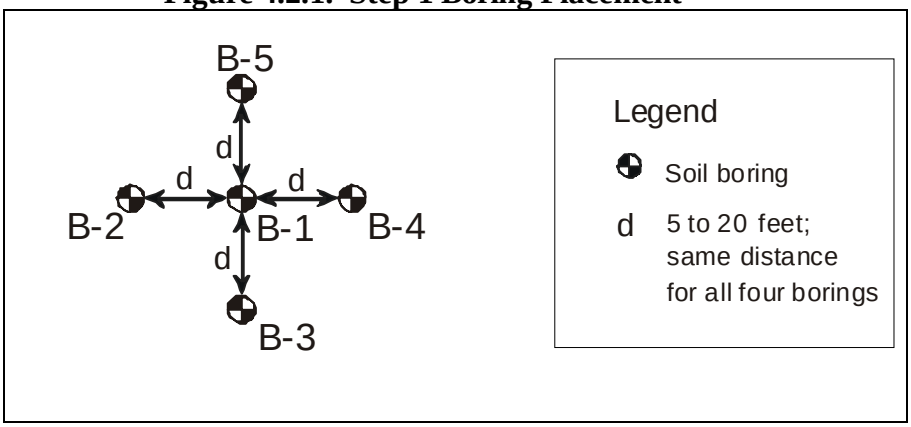
Step 1

Step 1 consists of advancing five borings in the immediate area of the release. For small releases, this procedure may define the outer limits of the source area. One boring should be located at the spot expected to be the most contaminated (the center boring) based on surface soi screening results or other information obtained during presampling activities. Four borings should be placed at a uniform distance from the center boring (5 to 20 feet out) in each of the four genera directions at perpendicular axes (see Figure 4.2-1). In areas where it may be impractical to use perpendicular axes, random orientation of the axes is acceptable.

If chemical of concern (COC) concentrations from all five borings are below the residential default closure levels, characterization is complete and subsurface soil does not require remediation. If the COC concentrations in the four outer borings are below these default levels but the concentration in the center boring is above, a potential exposure concentration (PEC) should be calculated as the mean of the concentrations in all five borings plus one standard deviation. The standard deviation is calculated using the soil boring COC

concentration data as a sample of the population of available data. Because the source size in this scenario is less than 0.25 acre, the PEC should be compared to the 0.25-acre default closure level for the appropriate land-use category. If the PEC is less than the closure level, characterization is complete.

Figure 4.2.1. Step 1 Boring Placement



Step 2

If Step 1 did not indicate that soil COC concentrations in the four outer borings are at or below the residential default closure levels, the investigation proceeds to Step 2. Step 2 is a comparison value calculation based on results from regularly spaced borings along two intersecting lines that traverse the extent of the release.

The Step 2 investigation consists of placing additional borings outward from the center boring in each direction where the residential default closure levels were exceeded. These borings should be continuously placed 5 to 20 feet from each other along the axis until soil COC concentrations are at or below the closure levels for the COCs. Allowance can be made for above- or underground obstacles, but the distances between all borings along the two lines should be as close to the same as possible. Figure 4.2-2 illustrates an example of the Step 2 boring strategy

Once the extent of contamination in all four directions has been determined, the PEC can be calculated using data from all of the borings along all transects where Step 2 sampling was conducted. Samples below the EQL are calculated as ½ the EQL. As noted above, the PEC is the mean of the soil COC concentrations from all borings plus one standard deviation calculated using the concentrations as a sample of the population of available data.

The source size should be calculated by squaring the length of the longest transect. Source size categories are less than 0.25 acre and 0.25 to 0.5 acre. The PEC should be compared to the appropriate source size and land use-specific closure level in Tables 4.1-1 and 4.1-2 in Appendix 4.1. If the PEC is less than the appropriate default closure level, characterization is complete. If the PEC exceeds the default closure level, the site can be remediated to the default closure levels or a nondefault risk assessment can be conducted.

Figure 4.2-3 presents a flow chart describing the decision-making process involved in characterizing subsurface soil.

Figure 4.2.2: Step 2 Boring Placement

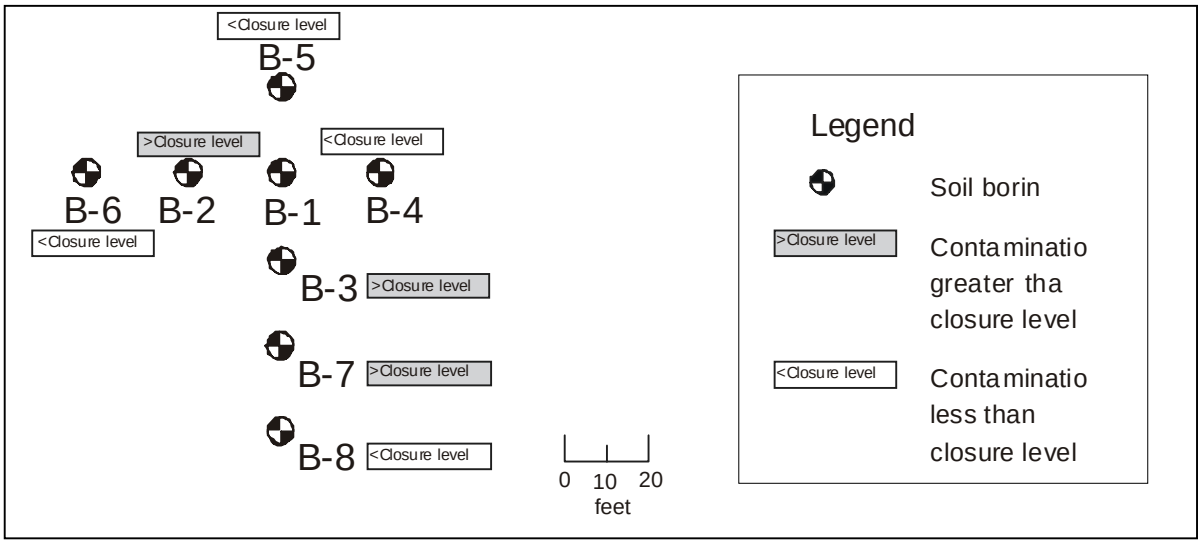
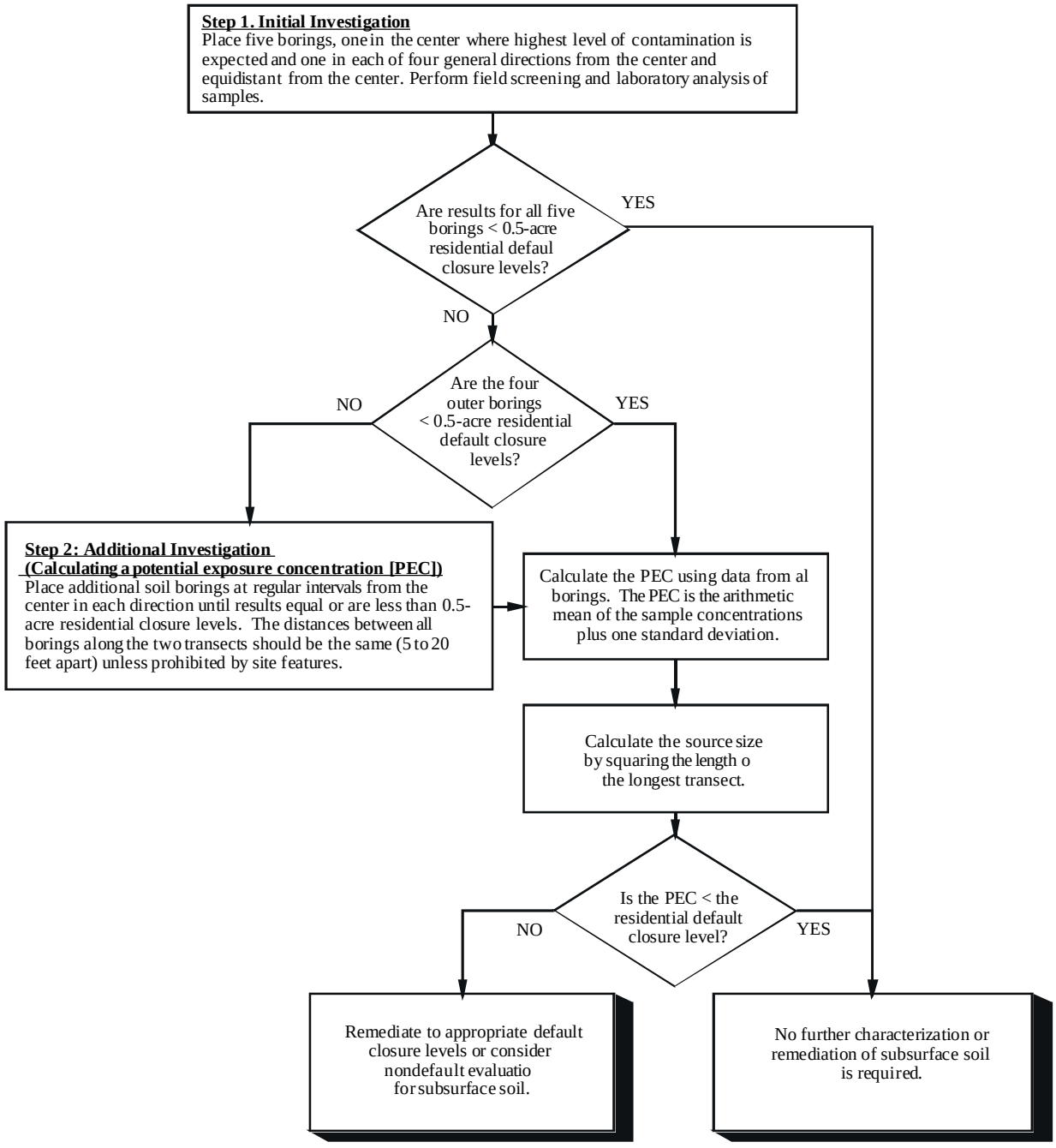


Figure 4.2-3. Flow Chart of Decision-Making Process for Petroleum Releases



INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
NONRULE POLICY DOCUMENT

Title: Excess Liability Trust Fund/Risk Integrated System of Closure
Identification Number: Waste - 0039 - NPD
Date Originally Adopted: February 10, 2000
Dates Revised: December 14, 2000
Other Policies Repealed or Amended: None
Brief Description of Subject Matter: This document will address whether the Excess Liability Trust Fund (ELF) will reimburse eligible parties for the costs incurred in implementing a corrective action plan using the Risk Integrated System of Closure (RISC).
Citations Affected: IC 13-23-8, IC 13-23-9, 328 IAC 1-3-5

This nonrule policy document is intended solely as guidance and does not have the effect of law or represent formal Indiana Department of Environmental Management (IDEM) decisions or final actions. This nonrule policy document shall be used in conjunction with applicable laws. It does not replace applicable laws, and if it conflicts with these laws, the laws shall control. revision to this nonrule policy document may be put into effect by IDEM thirty (30) days after the revised nonrule policy document is made available for public inspection and comment and is presented to the Financial Assurance Board. IDEM will submit revisions to the Indiana Register for publication.

The IDEM will be issuing a policy regarding the cleanup of sites using a risk based system [Risk Integrated System of Closure (RISC)]. This policy will replace the current policy for the remediation of leaking underground storage tanks, contained in the 1994 Underground Storage Tank Manual. Upon implementation of the RISC policy, there will be a transition period during which responsible parties will have to choose which policy they want to proceed under. This decision will be required on all sites undergoing corrective action. After the implementation of the RISC policy, responsible parties reporting releases must develop corrective action in accordance with the RISC policy.

There have been questions regarding whether the Excess Liability Trust Fund (ELTF) will reimburse responsible parties for corrective action costs under RISC and if so, under what conditions. IDEM does not intend to promulgate rules for this transition period because IDEM believes that the current rules are flexible enough to provide for reimbursement under RISC, as long as the responsible party has an approved Corrective Action Plan (CAP). Also, as the RISC policy is expected to be implemented in the second half of 2000, rules could not be promulgated quickly enough. Therefore, IDEM is issuing this nonrule policy document to explain how it intends to interpret the laws and rules concerning ELTF reimbursement.

IC 13-23-8-4(a)(5) requires that the responsible party have an approved CAP to be eligible for reimbursement from ELF. The CAP must be developed in accordance with the Underground Storage Tank Guidance Manual, ***including the department's risk-based corrective action plan standards when the standards become effective.*** Thus, IDEM has the authority to require and approve CAPs that are developed in accordance with IDEM's policies.

To ensure the solvency of the ELTF, IDEM will require owners/operators to submit cost comparison to show the cost benefit of changing a site currently undergoing remediation under the 1994 Underground Storage Tank Guidance to a RISC based clean-up approach. IDE will review the comparison and make a determination as to which method of remediation would be most cost effective.

Schedule for the ELTF reimbursement of LUST costs for sites during the transition to the RISC Policy.

Eligible Costs

*Costs incurred **before the implementation and transition period of the RISC policy**, including:*

❑ **Costs incurred in the implementation of an approved CAP that is consistent with the 1994 Underground Storage Tank Manual.**

❑ **Costs associated with the collection of data that will be used in a decision as to which policy the responsible party wishes to use.**

❑

***Costs incurred throughout the transition period for the RISC policy**, including:*

❑ If the responsible party has an approved Corrective Action Plan (CAP), costs incurred for corrective action, regardless of whether the CAP is developed under the current guidance or under the RISC Guidance would be eligible.

❑ Costs associated with transitioning a site from the 1994 policy to the RISC policy.

❑ Costs associated with the collection of data necessary to make an informed decision as to which policy to proceed under.

❑ Costs incurred in acquiring environmental notices (these costs will be considered third party claims and will be processed in accordance with IC 13-23-9-3).

❑

*Costs incurred once the RISC polic **transition period has ended**, including:*

❑ **Costs incurred for corrective action at leaking underground sites which have approved CAPs.**

❑ **Costs incurred in acquiring environmental notices(these costs will be considered third party claims and will be processed in accordance with IC 13-23-9-3).**

❑

Ineligible Costs

Costs not reimbursable under any circumstance:

- ❑ Costs that are not eligible under 328 IAC 1-3-5.
- ❑ Costs that do not fall within the reasonable cost range established under 328 IAC1-3-5.
- ❑ Costs associated with the development of a CAP under the RISC policy before the policy has been implemented, other than those costs associated with the collection of data which will be used in a decision as to which policy the responsible party wishes to use.
- ❑ Costs associated with transitioning a site from RISC will not be paid for by the ELTF if these costs would be greater than the costs to complete the remediation under the 1994 Underground Storage Tank Manual.

FACT SHEET

EXCESS LIABILITY TRUST FUND (ELTF) AND RISK-INTEGRATED SYSTEM OF CLOSURE (RISC)

OFFICE OF ENVIRONMENTAL RESPONSE **JUNE 2000**

Are RISC characterization activities and costs associated with RISC guidance cover under ELTF?

One of the eligibility criteria for ELTF reimbursement is an approved corrective action plan (CAP). The CAP details remedial action and goals to obtain closure. Therefore, whatever is in the IDEM-approved CAP is reimbursable. Funds for release characterization are also eligible for reimbursement. This can include costs associated with characterization using RISC guidance prior to CAP implementation.

What is IDEM's position on ELTF reimbursement for cleanups completed to less than risk-based levels? Some property owners may want to conduct cleanup to nondetect levels.

As stated above, costs associated with activities approved in the CAP are reimbursable. Costs incurred for activities conducted beyond what is in the CAP are **not** eligible for reimbursement. Generally, only land-use based default levels are acceptable remedial goals in approved CAPs. However, in certain situations, residential levels can be approved. For example, residential levels are acceptable if the property is leased and property control cannot be obtained for the site. Another example is a site that results in ecological impacts or that has a direct path to an ecological area, which may necessitate a lower cleanup level.

Who is responsible for reimbursement criteria?

The responsibility for CAP approval rests with IDEM. The responsibility for reimbursement criteria rests with the Financial Assurance Board (FAB). Through rulemaking, the FAB has established reasonable costs for most activities associated with corrective action.

What impact will RISC have on reimbursable costs under the Excess Liability Fund (ELF) Program?

The FAB has adopted a nonrule policy document (see Appendix 5-2 of the User's Guide) that deals with ELTF's interaction with RISC. The FAB will also be promulgating rules which, in part, will implement RISC as part of ELTF.

What is the current mechanism for CAP approval?

There is a new mechanism for reviewing CAPs within the ELF Program. A private contractor has been awarded a contract to review both ELTF claims and CAPs. The contractor will perform a technical review of the CAP and forward this review to IDEM. IDEM will then approve or deny the CAP based on the technical information provided by the contractor.

How will RISC affect the contents of CAPs?

For permanent closure, the CAP will still detail remedial actions and goals. IDEM will review and approve CAPs as before. The main change is that if remedial goals are greater than residential standards, environmental notices will need to be in place prior to CAP approval. This requirement also applies to closure with institutional controls because closure with institutional controls depends on preventing exposure to contamination at concentrations that exceed human health-based levels. Therefore, the environmental notice is the key component of exposure prevention in the RISC guidance.

If environmental notices are not in place prior to CAP submittal, it will be difficult to determine whether closure with institutional controls can be utilized. For example, if closure with institutional controls is desired for a site with off-site ground water contamination and IDEM approves the CAP before off-site notice is obtained but no agreement can be reached regarding the environmental notice, the point of compliance (POC) could move from off site to the site property boundary. In this case, remedial action is required to bring the plume back to where property control ends. Now a CAP addendum must be submitted to IDEM to propose remedial action to bring the POC into compliance.

At this time, it is anticipated that CAP submittal and approval can be completed prior to the completion of 2 years of plume stability monitoring. If a CAP is submitted that proposes a closure with institutional controls for ground water **and** property control is documented, the CA can be reviewed and approved based on the information supplied. If the CAP is approved but the plume later fails the stability test, either a remedial plan can be prepared and implemented or plume stability can be modeled as a nondefault option.

Will the ELF Program reimburse costs associated with obtaining environmental notices for property not owned by the ELTF participant?

Costs associated with environmental notices can be included in third-party claims, which IC 13-23-9 states that IDEM will reimburse. However, the Attorney General's office will review all third-party claims to determine whether they are reasonable. In other words, if an ELTF participant pays an amount that exceeds what the Attorney General considers to be reasonable, the participant will not be reimbursed for the full amount of the claim. The Attorney General's office may request additional documentation, such as appraisals or affidavits, to support a determination that the costs are reasonable.